The IRON AGE

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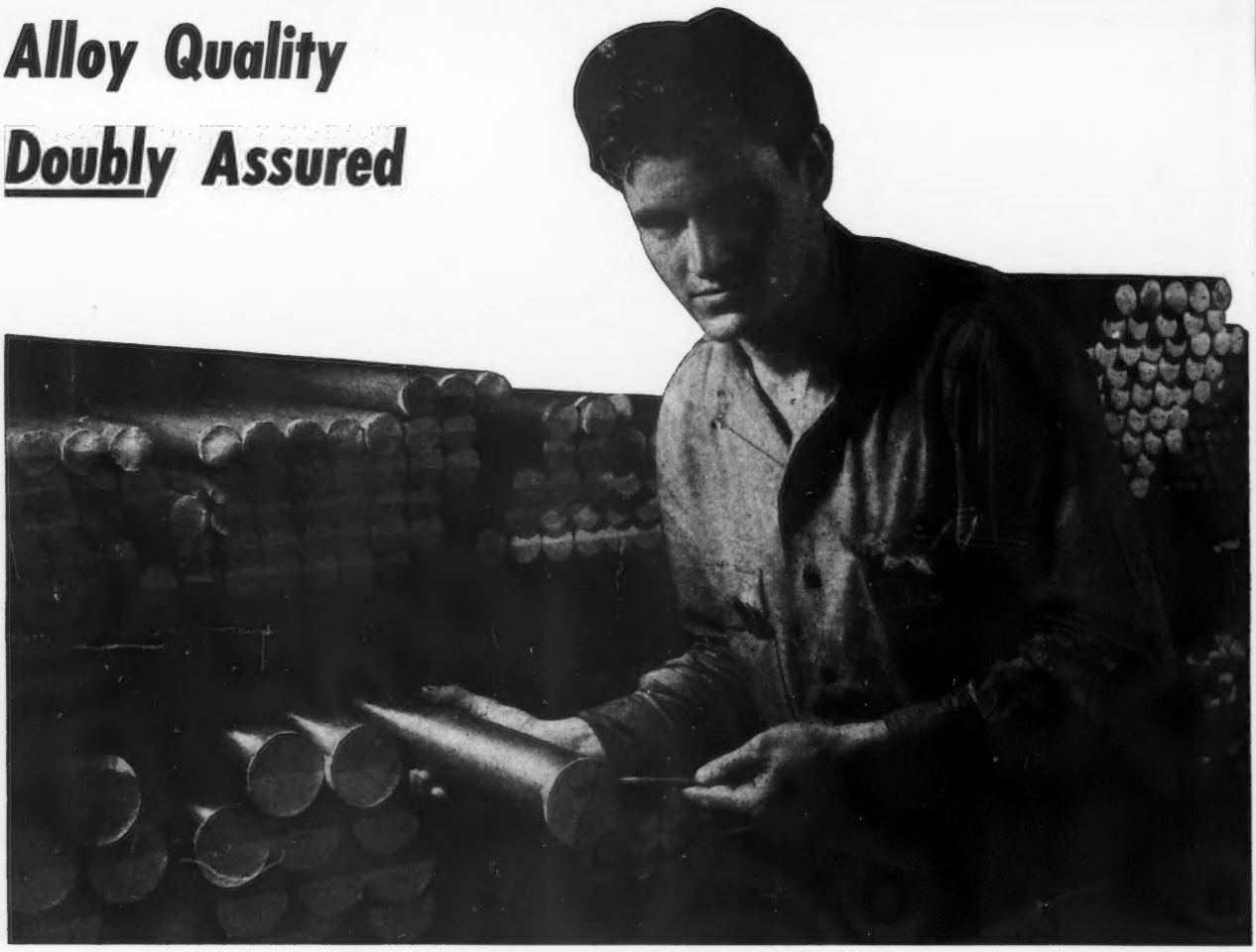

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For Money Alone!

A COMMON managerial complaint in heavy industry is that workers display no interest in anything but wages—that there's no feeling of responsibility and little of pride in accomplishment.

Worker loyalty is, unfortunately, one of the victims of extreme mechanization. Job skills are being progressively broken down into smaller fragments and the distance between management and worker is ever widening. The ramifications of many industrial complexes are such as to almost erase a worker's sense of importance and participation in a common understandable effort. To badge No. 81313, who spends eight hours daily languidly pulling a lever or twisting a screw, there's little sense of importance or emotional or psychological reward—it all is reduced merely to a matter of pay in an envelope.

There's no turning the clock back on industrialization, and only through the increasing tempo of mechanization lies the way to higher and higher physical standards of living. But the human frame needn't become merely a mechanized automaton.

Too often a flossy company magazine, somewhat lofty and patronizing in character, is assigned the task of capturing worker loyalty and enthusiasm. Or repetitive homilies on "free enterprise" are offered in lieu of concrete and understandable discussion and sharing of common problems.

A new and earnest effort is being made by the Allegheny Ludlum Steel Corp. to bridge the gap with workers and the communities in which they live. Preliminary questioning has disclosed an almost frightening lack of knowledge of the company's products and activities, its wage policies, its position and philosophy relative to industry as a whole.

Company officials are holding mass meetings in its plant towns of Watervliet, N. Y., and Brackenridge and West Leechburg, Pa., to apprise the communities as to current activities and future plans of modernization and expansion, to review its financial position and explain wage policies. Discussion is centered in four operating policies, namely: A genuine concern for the welfare of employees and the communities in which they live; the payment of better than average wages; the making of fair profits; the desire to prevent "boom and bust" in the economy.

Particularly educational is the way in which all company financial activities are broken down into a form readily appraised by anyone. All money received is shown as a total and then converted to average amount per employee per work-week. The same is done to raw material costs, taxes, payments to employees, payments to officers, payments in dividends, and amount retained by the company for modernization and expansion.

All this establishes a framework of knowledge on which to build detailed studies of each worker's participation and importance in the common production effort.

T. W. Lippert

A Word About Steel Claims

For more than fifty years Inland has been recognized as a leading manufacturer of uniformly high quality steel. But, at times, chemical analysis or method of manufacture does not always result in a product that can easily be formed or fabricated by *every* type of equipment. Occasionally human errors occur in the ordering as well as the production and fabrication of steel.

We recognize, in these situations, one of Inland's best opportunities to give practical metallurgical and engineering aid. So we urge you always to let us know whenever you might have the slightest difficulty in using any Inland product. Sometimes a different steel is required. Usually a slight change in forming or fabricating method may do the trick. But no matter what the cause or result may be, or whose steel is involved, in the Inland area, we are always ready to help you solve the problem to your complete satisfaction.

This policy of complete customer satisfaction has been in effect for many years. Its formulation and practice is the result of our desire to see that every shipment of steel does its job well.

Today, as you know, the great demand for steel exceeds production so we cannot supply all the steel needed by our customers. However, we are bending every effort in the development of new facilities to increase production output . . . so that, for your future needs, Inland will be an even better source of quality steel.

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► Widespread use of oxygen in the openhearth may have some unpleasant ramifications for producers of high grade ores whose product is now charged into the mix to reduce carbon content.

► Next to guided missiles and unguided rockets, the Army's big concern is better and lighter transportation. It is quietly seeking to develop a super-jeep which will out-jeep the present model and which can be adapted to dropping with airborne troops.

Also sought is a big brother to the jeep to replace the standard 2½-ton truck as well as a new type tank transport which not only can take steep grades and sharp turns without trouble but which can be used for any type of cargo without conversion.

► It is believed that Russia would like to see a change in U. S. policy in China but Washington observers doubt that General Marshall will oblige. And those Americans who seek withdrawal of U. S. troops from China probably don't realize the trouble they'd have getting electric light bulbs and storage batteries if the U. S. did not have free access to China's tungsten and antimony.

► French Government authorities have decided to place the equipment requirements for the first continuous hot strip mill they have on order here in the first segment of industrial equipment for delivery from the United States from dollar credits recently made available.

► Sharp increases in coal mine wages without corresponding increases in productivity will decrease the margin between coal and a principal potential competitor, atomic power. Oil is already a more serious threat than it was a decade ago and refinements in atomic power generation appear almost certain to narrow today's cost gap.

► Some brass mill operators who would have been glad to buy surplus mill equipment from government plants have been forced to place orders for new equipment which may not be delivered until mid-1948. Some sources lay their inability to buy government surplus to a delay in establishment of WAA policy due to localized political situations.

► After more than a year of contention it has been officially announced that the German Volkswagen, or people's car, is being nominally sold in the British Zone of Germany for $640. Cost of production, now running at 30 units daily, can not be accurately determined because of price controls on all components. The cheapest British light car sells for $916.

► One of General Electric's largest divisions, its aircraft gas turbine unit, is now undergoing a 2-year expansion program, including a $500,000 project to test far more powerful jet engines, some of which are still on the drawing board.

► Despite critical housing needs, the Dutch continue to shy away from prefabricated homes. No more than 1000 of the 30,000 units scheduled for completion in 1947 will be of the factory-built type, imported from England.

With the war completely wrecking 95,000 units and new building non-existent for 5 years, housing needs for the Netherlands are set at 250,000 units but the average Dutchman prefers the traditional brick and will wait until labor and materials are available to provide it.

► Instead of cutting stainless steel rings or sawing them from plate a less expensive method is to make them from bar stock by roll bending and flash welding.

► One relatively small cold-metal openhearth shop has developed the use of anthracite coal and byproduct coke in combination as a means of making up the carbon deficiency of high-scrap low-iron charges.

► European press reports state that a new steel plant is to be built in Denmark for the production of stainless products. Swiss interests are said to be participating in the financing of the project.

► Though American aviation interests have tended to discount the possibilities of jet propelled airliners in this country for some time to come, it is known that the British are flying a plane on a combination of two reciprocating and two jet engines.

X-Ray Diffraction Analysis of Cold W

By F. ZANKL
Instructor in Physics, Marquette University and Research Dept., Kearney & Trecker Corp., Milwaukee
and
A. G. BARKOW
Associate Professor of Physics Marquette University, Milwaukee,
and
A. O. SCHMIDT
Research Engineer in charge of Metal Cutting Research Kearney & Trecker Corp., Milwaukee

NUMEROUS investigations have been carried out concerning milling cutter designs and angles. These will affect power consumption, tool life, surface finish, economy of production, and numerous other factors; one of the most important considerations in milling cutter design is the radial rake angle, fig. 1.

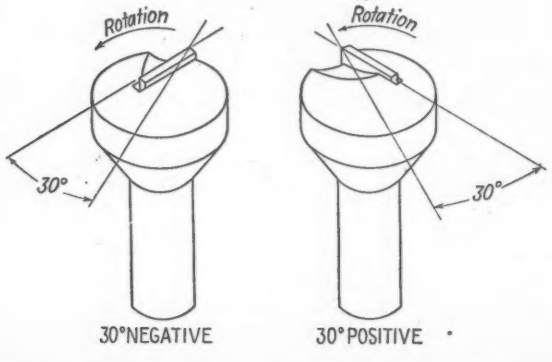
The study and analysis of the stresses in the workpiece involved in milling are of utmost importance. To be able to say definitely that a certain radial rake angle on a cutting edge caused more or less cold work than another has been a subject for discussion for some time.

A conclusive series of experiments[1] were conducted by J. B. Armitage and A. O. Schmidt. In these investigations test cuts were taken with milling cutters having various radial rake angles. Observations made at the beginning and end of each test cut included calorimeter temperature and surface temperature of the test bar, measured, respectively, with a mercury thermometer and an Alnor low range thermocouple. An Esterline-Angus recording wattmeter was connected to the milling machine drive motor for power input determinations. Conclusions arrived at in this investigation were based exclusively on heat measurements of the calorimeter, from which the heat of the chips was determined. Test bars were cut dry, the chips falling directly into the circulating water. The variation of tool force with various radial rake angle is shown by means of a graph, fig. 2. An examination of this graph augments the theory that the greatest tool forces are caused by a 30° negative radial rake angle, and the least are caused by a 30° positive rake angle. Further considerations from these experiments showed that this relationship held true for any cutting speed between 194 and 1180 fpm. Since the graph is a straight line, it is to be expected that the greatest amount of surface deformation would be caused by the rake angle creating the greatest tool force, since deformation should be proportional to the force causing it. In fig. 3 is shown the surface temperature of the workpiece as measured on identical testbars made of SAE 1055 steel which indicates a similar increase in work done on the testbars for the negative radial rake angles. These measurements were taken immediately after each cut with an Alnor low-range thermocouple.

Some of the conclusions from these experiments

[1] *Schmidt, A. O., Thermodynamics in Metal Cutting. Marquette Engineer, Vol. XIX, No. 3, March 1945, pp. 75-78.*
Schmidt, A. O., Gilbert, W. W., and Boston, O. W. A Thermal-Balance Method and Mechanical Investigation for Evaluating Machinability. Trans. ASME, Vol. 67, No. 4, May 1945, pp. 225-232.
Armitage, J. B., and Schmidt, A. O. An Investigation of Radial Rake Angles in Face Milling. Trans. ASME, Vol. 66, No. 8, November 1944, pp. 633-643. Western Metals, July 1945, pp. 11-16, August 1945, pp. 9-13.
Schmidt, A. O., Gilbert, W. W., and Boston, O. W. Measurement of Temperatures in Metal Cutting. Trans. ASME, Vol. 68, No. 1, January 1946, pp. 47-49; Tool and Die Journal, Vol. XI, No. 5, August 1945, pp. 115-120.
Schmidt, A. O., Cutter Design Evaluated by Production Runs. Mech. Engineering, Vol. 58, No. 5, May 1946, pp. 427-431; THE IRON AGE, *Nov. 22, 1945, Vol. 156, No. 21; Automobile Engineer, Vol. 36, July 1946, pp. 309-310.*

FIG. 1—Type of cutters used in the tests. The angles indicated show the method of recognizing a positive or negative radial rake angle.



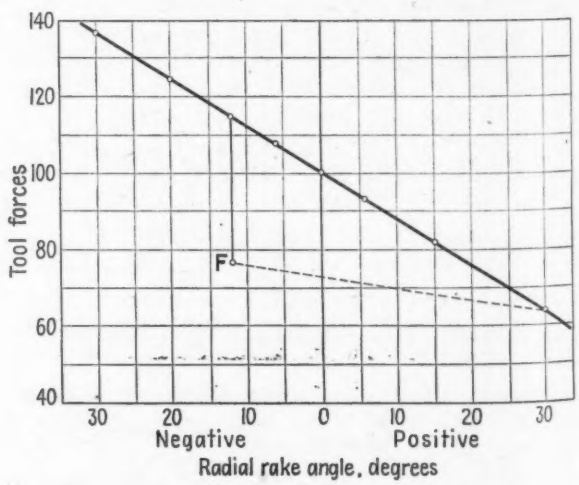


FIG. 2—Effect of various radial rake angles on tool forces acting on a face milling cutter, considering 0° rake as 100. Point F represents a cutter with a negative primary rake of 12° and a positive secondary rake of 30°.

Work Produced by Face Milling . . .

X-ray diffraction analysis has established the fact that the degree of cold working is affected by the radial rake angle of the milling cutter. As a result of the tests described herein, it can be shown that a negative rake produces more intense and deeper cold working, in addition to requiring more power.

were: Power required at the cutting edge is higher for the negative radial rake cutter than for cutters with positive radial rake angles. This holds true for conventional cutting speeds as well as higher cutting speeds up to 1180 fpm. A cutter with a 15 or 30° positive secondary radial rake angle and provided at the cutting edge with a negative primary radial rake angle one to two times the width of feed per tooth was found to be a more effective cutter, since it combined the increased strength of the cutting edge afforded by negative radial rake angles and the lower power requirement of the cutter with a positive radial rake angle. Cutters of this improved design have been tested on long production runs and were found superior in the number of workpieces machined and also more economical in many ways.

The term primary radial rake angle is applied to the angle which is ground on the tip of the secondary radial rake angle. This primary angle can be positive or negative depending upon the material to be machined. It forms a small face on the tip of a positive secondary angle as shown by angle B in fig. 4.

Zlatin and Merchant[2] conducted a micro scale study of the hardness of sections taken through chips and machined surfaces obtained under various machining conditions, and of the relation of this hardness to the geometry and mechanics of chip formation. A Tukon micro-hardness tester employing a Knoop indenter was used for these studies. It was found that steels may be severely hardened by the cutting process, very high increases in hardness having been observed.

The work of O. W. Boston[3] shows that the cutting force decreased as the rake angle of the cutting tool was increased positively.

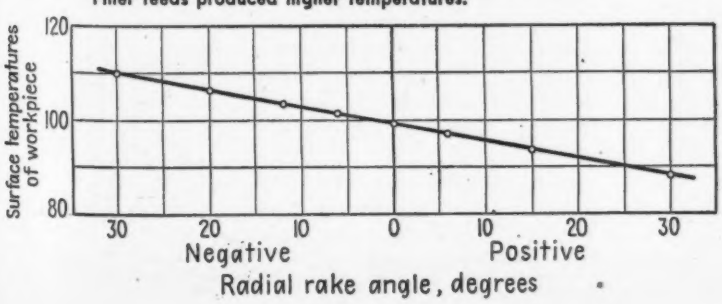
There are still a number of questions regarding what actually happens at the tip of the tool when a chip is removed from the workpiece. Since these questions are not yet all answered, and often misleading statements are made concerning machining, this study has been undertaken to correlate the effect of radial rake angles and the work done by the cutter on the workpiece. An analysis of the subsurface condition of the workpiece should indicate that cold work produced in the workpiece is a function of the radical rake angle of the cutter.

The application of X-ray diffraction analysis, and control of heat and recrystallization of cold-worked metals is well known. When a material, especially a metal, is cold worked, the crystal planes become bent and distorted. Reflection of X-rays from a crystal with a distorted lattice is analogous to reflection from a cylindrical plane. Hence, an undistorted grain will reflect X-rays to make a sharp spot, while a distorted

[2] *Zlatin, N., and Merchant, M. E., The Distribution of Hardness in Chips and Machined Surfaces. ASME paper semi-annual meeting, Detroit,* 1946.

[3] *Boston, O. W., The Elements of Metal Cutting. Dept. of Engineering Research, University of Michigan, Ann Arbor Engineering Research Bulletin No.* 5, *December* 1926, *p.* 25.

FIG. 3—Effect of various radial rake angles on the surface temperature of 1-in. diam hot-rolled stock milled at 300 fpm with 0.006-in. feed per tooth and 0.125-in. depth of cut. Higher cutting speeds and heavier feeds produced lower temperatures. Finer feeds produced higher temperatures.



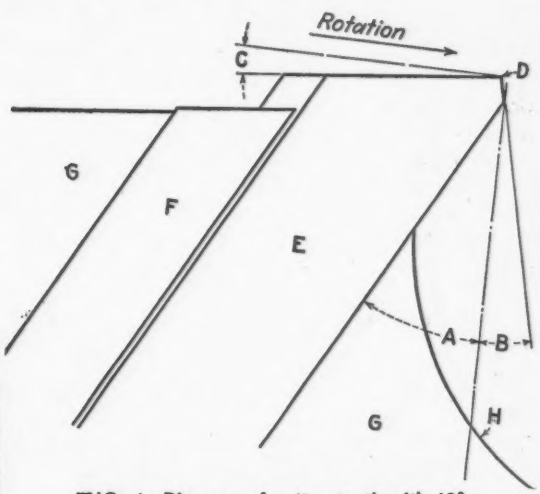
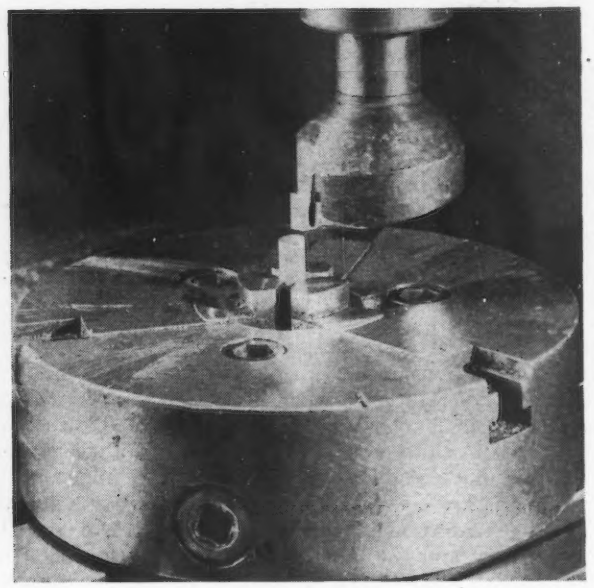


FIG. 4—Diagram of cutter tooth with 12° negative primary rake B, and positive secondary rake A. Peripheral clearance angle is shown at C, cutting edge at D, solid carbide blade at E, wedge at F, body at G, and chip clearance space at H.

lattice will make diffused spots or elongated spots on the film. This is commonly referred to as asterism. If the particle size is within the range which will produce uniform concentric Debye-Sherrer rings, the rings will become blurred due to the elongation of all small crystallites in all directions. The best way to analyze a phenomenon of this type is to study and observe the resolution of the K_a doublet. The lack of resolution of the observed doublet becomes a semi-quantitative measure of the amount of cold work that the specimen has undergone. This method can be applied effectively to find the depth to which a metal has been cold worked by a machining operation. Indirectly this also becomes a measure of the amount of work which has been expended on the stock, in comparison with the amount of work that has gone into the chips and the tool. A series of photographs is made by the reflection of X-rays from the metal surface after successively increasing depths have been etched away. When further etching causes no further increase in sharpness of the spots, or better resolution in the K_a doublet, the bottom of the worked layer has been reached.

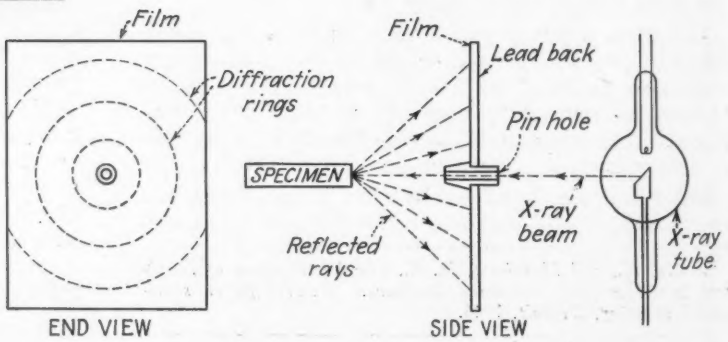


ABOVE

FIG. 5—Dowmetal specimen showing method of holding while taking test cut.

RIGHT

FIG. 6—Schematic layout of back reflection camera used to obtain diffraction pictures.



In this case the problem of immediate concern was the depth of cold work developed in magnesium and steel alloys due to variation in the rake angle of the cutting tool. The results obtained were correlated with those received thermodynamically by the investigations mentioned above.

Materials and Preparation

Three types of materials were used in these tests. The first was a J-1 type Dowmetal. This metal was a solid solution of aluminum, zinc, and magnesium. The complete analysis is given below.

Aluminum	**5.8 to 7.2**
Manganese	**0.15**
Zinc	**0.4 to 1.5**
Silicon	**0.3**
Magnesium	**Remainder**

The second material used was a M-type Dowmetal. This alloy had a high manganese content and was a solid solution of manganese and magnesium. The complete analysis is given below.

Manganese	**1.2**
Silicon	**0.3**
Magnesium	**Remainder**

Sample specimens of these materials were prepared, numbered, heat treated, and then handled in such a fashion as to prevent any strains in the metal prior to the time they received the actual test cuts.

The third material used in these tests was an SAE 1020 steel. This steel was in the form of a ¾-in. square bar. After being cut to length the samples were heat treated for stress relief.

The milling cutters used in the Dowmetal tests were all identical with the exception of the radial rake angles. The following is a list of the radial rake angles that were used.

A = 30° positive radial rake angle
B = 12° positive radial rake angle
C = 0° radial rake angle
D = 12° negative radial rake angle
E = 30° negative radial rake angle
F = 30° positive radial rake secondary angle with a 12° negative primary angle

The milling cutters were all 3-in. diam face milling cutters equipped with a single cemented carbide cutting tip sharpened with a diamond wheel. All of the cutters had a zero axial rake angle and were maintained with a keen cutting edge during these tests. The test cuts were performed on a Kearney & Trecker 2K Vertical milling machine as shown in fig. 5. The specimens were held in the jaws of a vertical chuck during cutting. At all times, at least ⅝ in. of the specimen extended above the jaws. This was done to insure against straining the specimen in clamping.

The Dowmetal specimens were milled at three separate surface speeds. These speeds were 1180, 785, and 107 fpm. In each case the feed rate was adjusted so as to produce chips of approximately the same thickness (0.003 in.) throughout the three tests. The three speeds 1180, 785, and 107 fpm used the following respective feed rates; 4¼, 3, and ⅜ ipm. These three surface speeds were used in order to observe th variation in the amount of cold work when the surface cutting speeds are varied. In the first group of specimens the depth of cut was 0.04 in. In the

second group of specimens the depth of cut was 0.08 in.

The camera used in these experiments was a back reflection type, as shown in fig. 6, using a flat film and a rather large pinhole arrangement. This large pinhole decreased the exposure time since it allowed a more divergent beam to strike the specimen and thereby irradiate a greater number of crystals. All the exposures were taken for a period of 30 min at a voltage of 35 kv and a current of 15 milliamperes. The radiation analyzed was the unfiltered K radiation from a cobalt target. The specimen was mounted in a saddle jig and held in the direct beam of the X rays at a distance of 5 cm (1.97 in.) from the film as shown in fig. 7. This permitted the rods to be removed and etched, after which they were again placed in exactly the same position in the back reflection camera. The first sample, which had been machined to a depth of 0.04 in. was placed in the beam for ½ hr. At the end of this time the film was removed and the picture developed. The milled surface of the specimen was then etched in a very dilute hydrochloric acid solution until 0.001 in. thickness of metal had been removed from the milled surface. All of the Dowmetal specimens were treated in the foregoing fashion. This procedure resulted in a diffraction picture being made available for inspection of the milled condition of the subsurface of the specimen in steps of 0.001 in. in depth. The number of steps necessary was determined by the depth of penetration of the cold work. The limiting depth of penetration of the cold work was reached when two consecutive photographs resulted in an identical diffraction pattern. The success of such a procedure is due to the fact that practically all of the diffracted X rays will be reflected from a depth less than 0.001 in. below the surface of the specimen being photographed. During the etching process it was necessary to etch the specimen very slowly since a considerable amount of heat was liberated in the reduction. This heat could easily act as an annealing treatment and thereby reduce the evidence of cold work crystal deformation in the specimen.

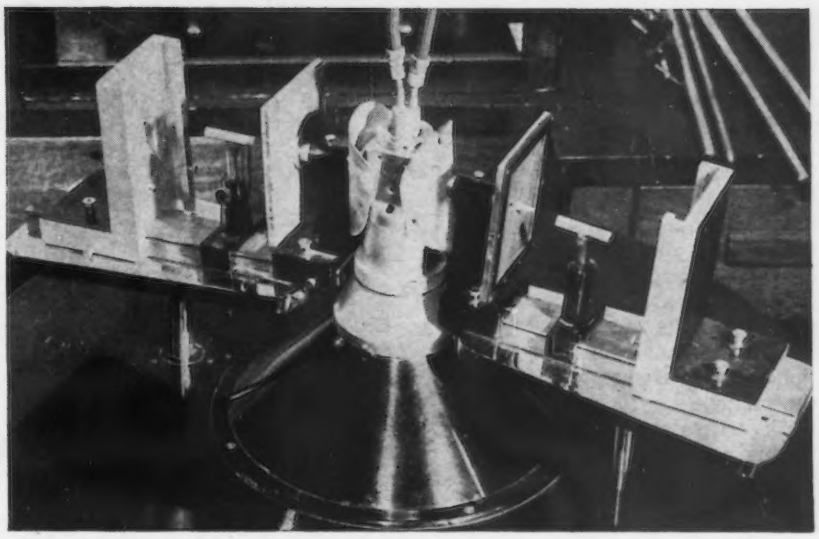
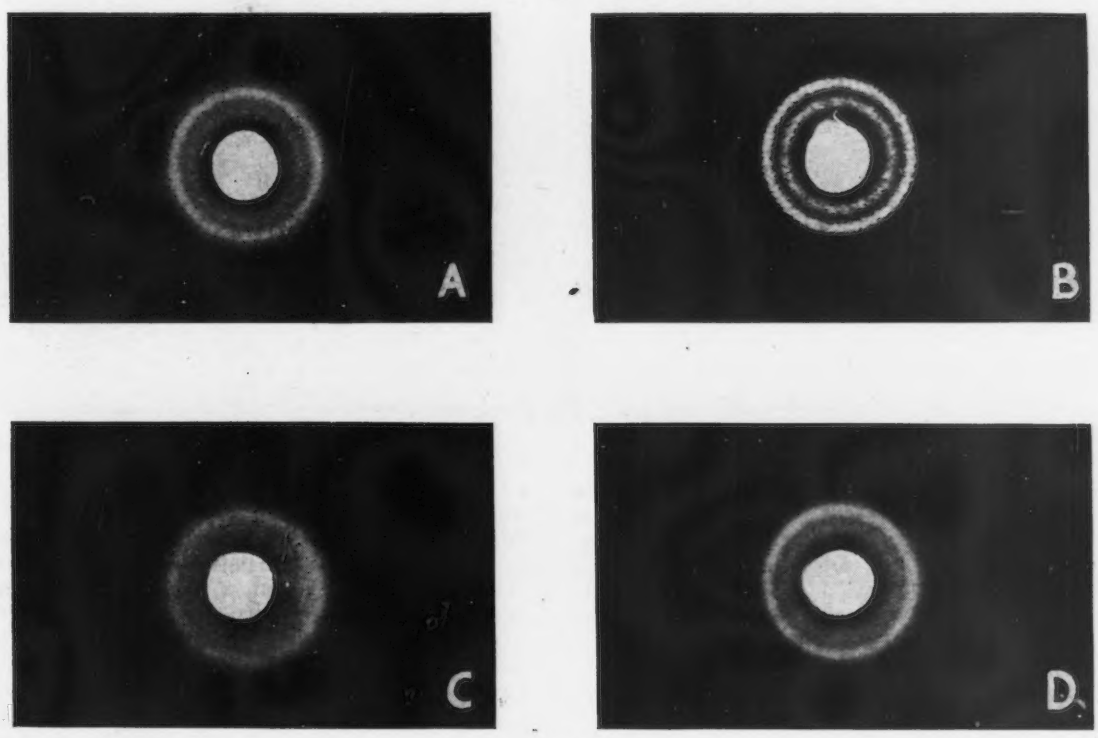


FIG. 7—Dowmetal specimen in position to receive X radiation. The rays are reflected upon the flat film from the milled surface of the workpiece.

A second group of Dowmetal specimens was all machined to an initial depth of 0.08 in. This series was performed in order to observe if the depth of crystal deformation due to cold work would penetrate deeper

FIG. 8—Diffraction patterns of type M Dowmetal milled with (A) 30° positive angle and no etch, (B) 30° positive angle and 0.003-in. etch, (C) 30° negative angle and no etch, (D) 30° negative angle and 0.003-in. etch.



under the surface of the specimen if the depth of cut were greater. In the J-1 type Dowmetal the variation in the amount of cold work was determined by a visual inspection of the amount of line broadening and distortion in the rings on the diffraction patterns at various depths of etching. In the analysis of the M-type Dowmetal the amount of cold work was determined by measuring the height of the peaks on a series of microphotometer traces which were run on the diffraction patterns. A microphotometer trace was made of each diffraction pattern. The height of the peaks K_{a1} K_{a2} lines were measured above the general background level and these results correlated to give values of distortion as compared to radial rake angles.

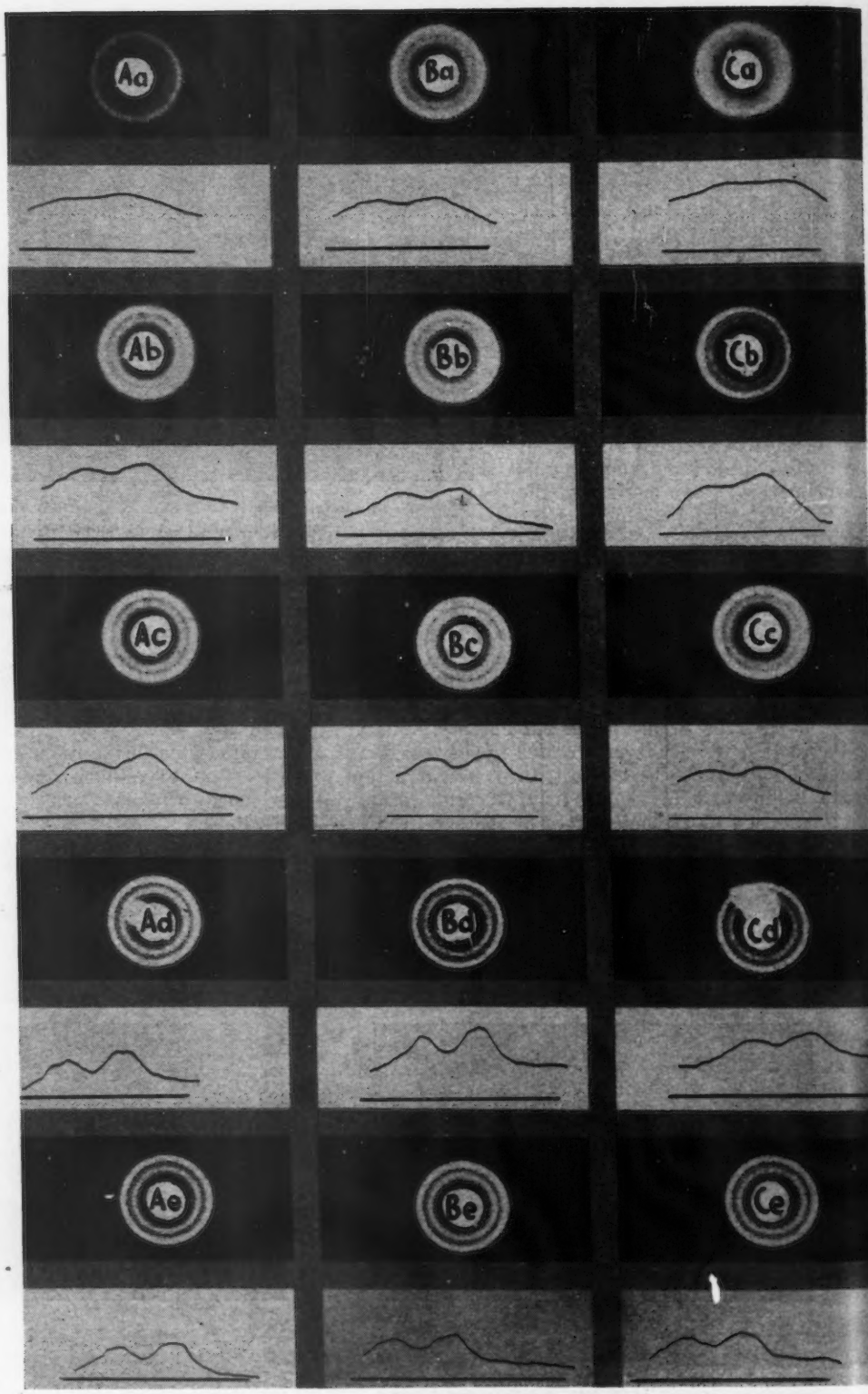


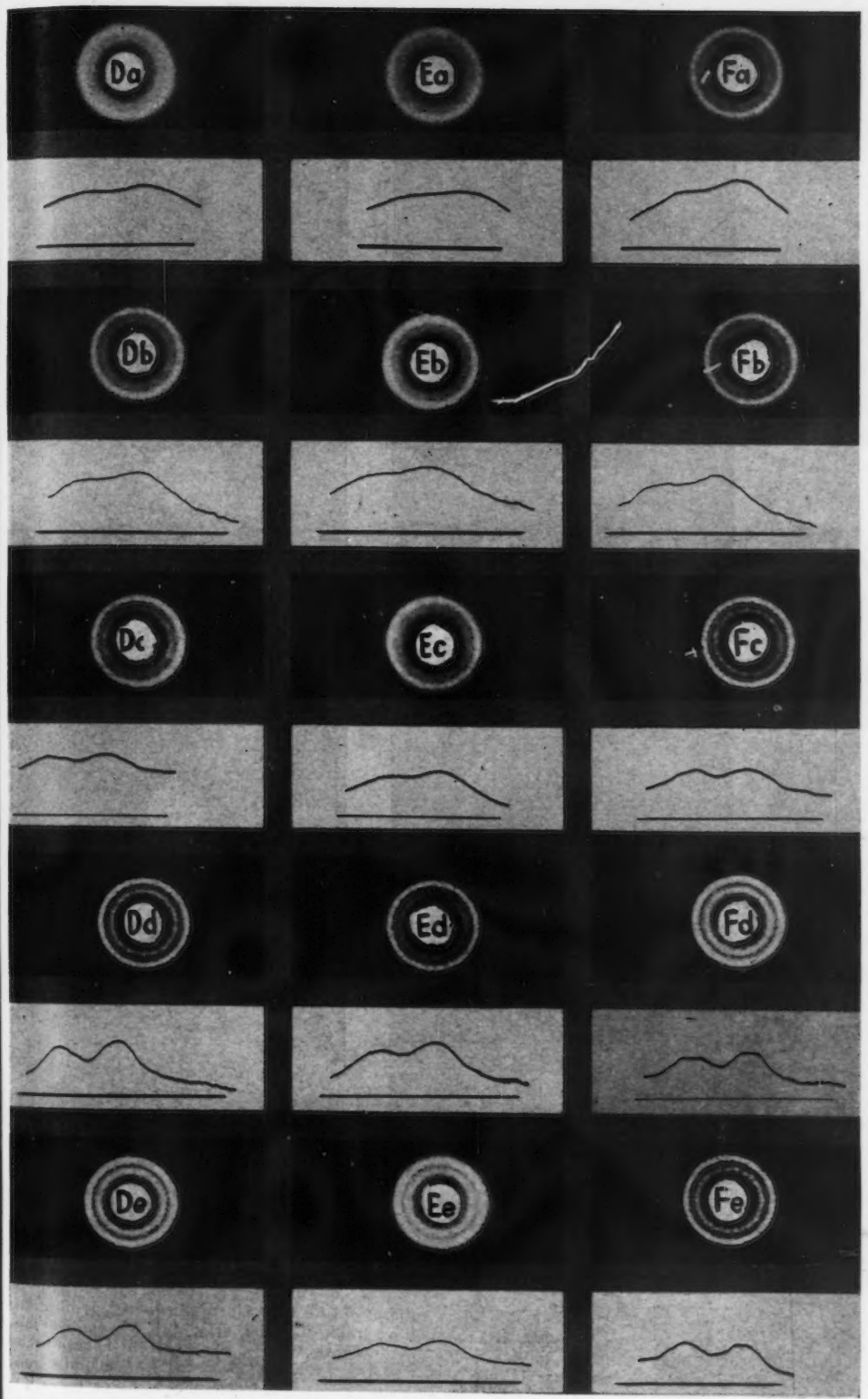
FIG. 9—Diffraction patterns of a type M Dowmetal milled

Results and Discussion

Due to space limitations the discussion here will be limited to several diffraction patterns which it is felt most nearly give a representative account of the actual experiment. Fig. 8 shows an M-type Dowmetal milled at 107 fpm with a 30° positive radial rake angle cutter and a 30° negative radial rake angle cutter. The specimen in pattern (A) was milled with a 30° positive angle cutter and the specimen in pattern (C) was milled with a 30° negative angle cutter.

An examination of these two patterns showed far greater resolution in the pattern marked (A). This showed that the greater cold work existed in the pattern marked (C). An examination of the patterns (B) and (D) revealed greater distortion and grain fragmentation due to cold work in the pattern marked (D). In this case (B) was the diffraction pattern of the sample milled with the 30° positive radial rake angle cutter after 0.003 in. had been etched from the surface. The diffraction pattern marked (D) was due to the 30° negative radial rake angle cutter after 0.003 in. had been removed from the surface by etching. The far greater resolution of the innermost lines in the pattern (B) leaves no doubt that the greater amount of cold work was caused by the 30° negative radial rake angle cutter as shown in (D). These results also show that a much greater penetration of cold work distortion is caused by the negative radial rake angle cutter.

Fig. 9 shows an M-type Dowmetal milled with vari-



at 1180 fpm with cutters having various radial rake angles.

ous radial rake angle cutters. The surface speed in this case was 1180 fpm, while the depth of metal removed was 0.08 in. The letters A, B, C, D, E, and F, denote the following respective radial rake angles: 30° pos., 12° pos., 0°, 12° neg., 30° neg., and 30° pos./12° neg. The letters, a, b, c, d, and e denoted the following respective depths of etch: 0.000, 0.001, 0.003, 0.004, and 0.005 in. An examination of the patterns A_a, B_a, C_a, D_a, E_a, and F_a revealed the fact that the greatest amount of cold work could be found in the pattern D_a and E_a. The least cold work was found in A_a. The cold work in pattern F_a ranged somewhere between the patterns A_a and B_a. A comparison of the microphotometer traces below each pattern also provides a similar indication of the amount of cold work. The trace below pattern E_a has the least resolution of the K_a doublet and so indicates that E_a has the greatest amount of cold work. An examination of the next line, A_b through F_b showed the greatest amount of cold work in E_b and the least in A_b. In all cases, it should be noted that the straight line below each microphotometer trace is not a reference level for intensity but merely an indication of the horizontal. An analysis of the line A_d through F_d shows that most of the cold work has been removed from A_d but that some cold work still exists in pattern E_d. The final line indicates a 0.005 in. etch. In this series it could be seen that the greatest cold work existed in pattern E_e. The microphotometer traces also showed such a trend. Therefore, from the pattern in fig. 9 it can be seen that the positive radial rake cutters caused the least cold work while the negative radial rake cutters caused the most. It is of interest to note that the amount of cold work due to a cutter with a 30° positive secondary radial rake angle and a 12° negative primary radial rake angle such as (F) was greater than that caused by a 30° positive radial rake angle cutter and less than that caused by a 12° negative radial rake angle cutter. Fig. 10 showed a production style cutter fitted with blades having radial rake angles of 15° positive of this type. In a previous report[4] this type of cutter (fig. 10) was

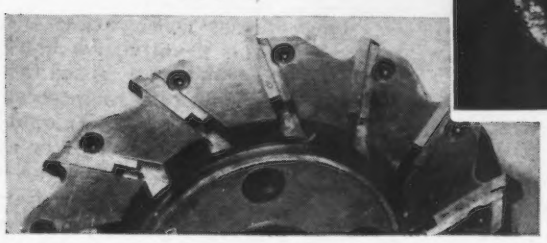
[4] *Schmidt, A. O., Cutter Design Evaluated by Production Runs.* THE IRON AGE, *Nov.* 22, 1945.

compared with those of general usage.

(1) machined substantially more workpieces between grinds,
(2) used cemented carbide material more economically,
(3) operated with less vibration and deflection of workpiece,
(4) consumed less power as shown by its ability to take heavier and deeper cuts without stalling the machine, and
(5) always produced an acceptable finish leaving no objectionable burr.

Fig. 11 shows a series of diffraction patterns of an SAE 1020 steel. In fig. 12, a, b, c, and d were milled with a 6° positive radial rake angle cutter. The specimens in patterns e, f, g, and h were milled with an 18° negative radial rake angle cutter. The cutting speed in each case was 572 fpm, feed 0.010 in. per tooth, depth of cut 0.0125 in. The patterns (a) and (e) had no etch. The patterns (b) and (f) had a 0.001 in. etch. The patterns (c) and (g) had a 0.0015 in. etch, and (d) and (h) a 0.002 in. etch. An examination of the patterns (a) and (e) showed considerable evidence of cold work in both patterns. The patterns (b) and (f) revealed a greater amount of cold work in (f). An inspection of (c) and (g) showed that most of the distortion due to cold work had been removed from (c) while the pattern (g) was still distorted and showed signs of cold work and crystal fragmentation. The pattern (d) had all the cold work removed while there was still evidence of cold work distortion in (h). From an inspection of fig. 11 it is evident that the 6° positive radial rake angle cutter caused less

FIG. 10—Typical production type face milling cutter with 12 inserted carbide blades at 15° positive secondary radial rake and with negative primary rake at the cutting edge.



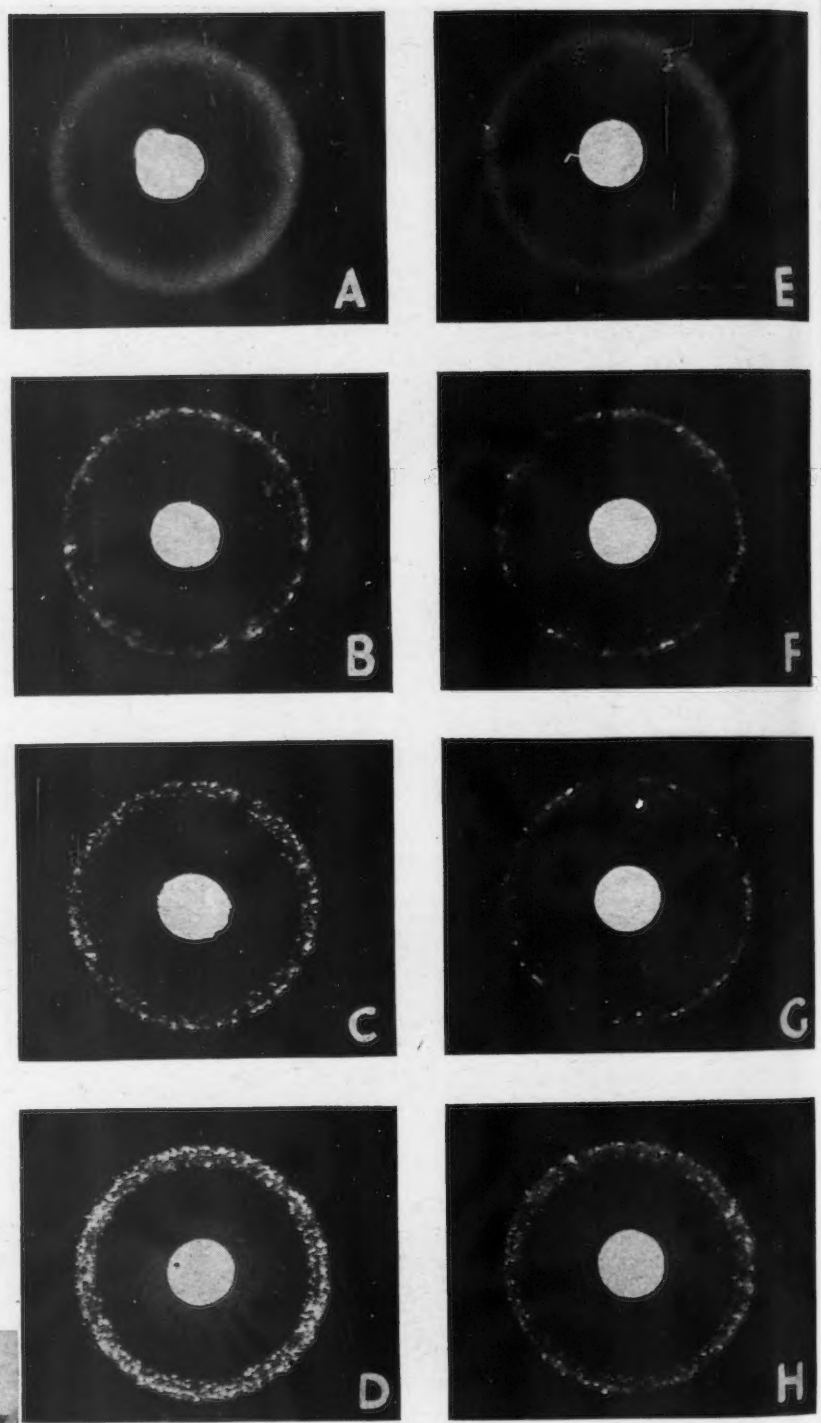


FIG. 11—Diffraction patterns of SAE 1020 milled with (a) 6° positive rake, no etch, (b) 6° positive rake, 0.001-in. etch, (c) 6° positive rake, 0.0015-in. etch, (d) 6° positive rake, 0.002-in. etch, (e) 18° negative rake, no etch, (f) 18° negative rake, 0.001-in. etch, (g) 18° negative rake, 0.0015-in. etch, (h) 18° negative rake, 0.002-in. etch.

cold work and less penetration of deformation than the 18° negative radial rake angle cutter. Here also, as in the case of the magnesium specimen, no visible difference existed in the surface finish of the test bars machined at the same cutting speed and feed with cutters of different radial rake angles. Profilometer readings of the steel test bars indicated from 23 to 28 microinches (rms).

From the foregoing results it is possible to state the following conclusions:

(1) Negative radial rake angle cutters produce more cold work in milling than do positive radial rake angle cutters.

(2) The depth of penetration of deformation due to cold work is greater when using negative radial rake angle cutters than when positive radial rake angle cutters are used.

(3) A cutter provided with a positive secondary radial rake angle (e.g. 30°) and a negative primary radial rake angle (e.g. 12°) at the cutting edge will cause less cold work than a 12° negative radial rake angle cutter.

(4) There is little difference in the depth of cold work produced in Dowmetal by cuts taken at the same feeds but at different depths.

How to Select Die Blocks

By R. G. SARTORIUS
Metallurgist and Engineer of Tests, National Lock Washer Co., Newark, N. J.

ALLOY steel die blocks of a chromium-nickel-molybdenum analysis are generally used in order to obtain such desirable characteristics as uniform hardness and resistance to impact, abrasion and heat.

Since the introduction of tempered blocks, machinable at a hardness of 60 Scleroscope (401 Bhn) and above, the use of annealed die blocks has been practically abandoned, and all but a small percentage are used in the prehardened condition. In addition to this, manufacturers supply die blocks heat treated to four different ranges of hardness suitable for practically all conditions governing the selection of die blocks.

No single range of hardness will give maximum production on all types of forgings. Various factors, such as quantity, shape, size and weight of the forgings and the type of metal specified, necessarily influence choice of the proper temper. For example, in the hardness range 70 to 67 Scleroscope, the maximum cross-section of the height by the length or width is recommended at 10 x 8 in. This degree of hardness is for use on very shallow impressions not over 3/16 in. deep and is primarily used for forgings of the flat tableware type requiring extremely close tolerances. In the hardness range 67 to 63 Scleroscope, the maximum cross-section of the height by the length or width is recommended at 12 x 10 in. This degree of hardness is for the use of very shallow impressions not over 5/16 in. deep and is primarily used for small forgings with very close tolerances. As regards the 63-60 Scleroscope range, the maximum cross-section of the height by the length or width is recommended at 14 x 12 in. This hardness is for relatively shallow impressions similar to the recommendations given under type 1 or "A" hardness and where, in addition, very close tolerances are required.

Once the most suitable temper of die blocks for a specific job has been determined through experience, care should be taken not to deviate from this hardness range. For a general guide, the following chart is presented correlating general die selection data (from Forging Handbook, by W. Naujoks and D. C. Fabel, American Society for Metals, Cleveland) with die-block producer trade names. It has been suggested that die block orders should specify (1) dimension by height, width and length, and (2) designation and hardness as listed in the chart.

		Ajax Steel & Forge, Detroit	Barium Steel & Forge, Canton, Ohio	A. Finkle & Sons Co., Chicago		Heppenstall Co., Pittsburgh	Titusville Forge Co., Titusville, Pa.
Prehardened Type H	For the production of smaller sizes of forgings which normally would be made in oil hardened dies, such as open-end wrenches and light forgings of stainless steel or Monel metal; also restrike and coining dies.	.....	.....	.....	Cuprodie Temper H** 61-56	.....	.....
Prehardened Type 1	For use in dies with shallow impressions up to approximately 3/8 in. average depth; for small tools such as wrenches and pliers; flat pieces such as ring gears; small brass and copper forgings; small automobile connecting rods; and similar parts of a generally regular and flat design. It is recommended that the maximum cross-section be not over 10 x 16 in. and whose length is not over 16 in. On a block of this hardness, the shank is drawn to a lesser degree of hardness to prevent breakage of the shank.	Ajax "AA" 57-61*	Barium "D" 57-61	FX Temper 1 55-60	Cuprodie Temper 1 55-60	Hardtem "A" 55-60	T Tempered "S" 56-60
Prehardened Type 2	For use in dies with relatively shallow impressions up to approximately 1 in. average depth, for the general run of average forgings which do not contain deep locks or intricate designs. It is recommended that the cross-sectional area of the height and width of the block be a maximum of 100 sq in. and whose length is not over 30 in.	Ajax "AB" 52-55	Barium "C" 52-56	FX Temper 2 50-55	Cuprodie Temper 2 50-55	Hardtem "B" 50-55	T Tempered "W" 51-55
Prehardened Type 3	For use in dies with average impressions up to approximately 3 in. deep for the general run of forgings. The greater toughness in this hardness of block permits the use of more intricate design of forgings, deeper locks, and large heavy forgings. It is recommended for use on blocks whose cross-sectional areas of the height and width has a maximum of 100 sq in. when not over 6 ft in length. On shorter blocks where the length is not over 3 ft a maximum cross-section of the height and width is recommended as 14 x 27 in.	Ajax "AC" 45-51	Barium "B" 47-51	FX Temper 3 45-50	Cuprodie Temper 3 45-50	Hardtem "C" 45-50	T Tempered "C" 46-50
Prehardened Type 4	For use in dies with deep impressions and intricate shapes. This hardness of blocks has greater toughness and durability, than the harder grade of blocks, but has not the wearing qualities or the resistance to the abrasive action of hot metal flow in the die impressions. Heat checking of the impression is minimized due to the lower hardness of this block. The size of this hardness of block is limited only by the capacity of the hammer and the size obtainable from the die-block maker.	Ajax "AD" 42-45	Barium "A" 42-46	FX Temper 4 40-45	Cuprodie Temper 4 40-45	Hardtem "D" 40-45	T Tempered "O" 40-45
Air Quenched and Tempered	This hardness of block is particularly adapted for the production of large heavy sections, for blocking impressions where the forging is blocked in a separate set of dies on relatively large and bulky pieces, and for use of flat or roller dies in drop hammers.	.....	Barium "T" 40-44	.....	.....	.....	.....
Annealed	The annealed block is generally used where a greater hardness is required than is obtainable in the regular oil-quenched and tempered blocks. The higher hardnesses are generally used on very small flat parts requiring extremely close tolerances.	Annealed 33 max	Barium "NS" 35 max	FS Annealed approx. 229 Bhn	Cuprodie Annealed approx 229 Bhn	Grade "C" Steel Annealed 34 max	T Annealed 34 max

* Hardness values are given as Scleroscope number, except as otherwise noted.
** For Cuprodie, Temper "H," the manufacturer claims: "Research has shown that but few forgings require die hardness exceeding 66 Scleroscope (477 Bhn), yet, Cuprodie blocks and inserts are readily machinable at those figures."

Roll Bending and Flash Welding Stainless St

FIG. 1—Made from two formed halves flash welded together, this octagonal motor frame requires exceptional precision. Material is 1-in. thick, 18¼-in. long, and dimensions are held to ±1/16-in. across flats and corners.

Production of stainless steel rings by cutting or sawing from plate is expensive. A method of successfully producing such rings from bar of either standard or special sections by roll bending and flash welding is described herein.

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By P. B. SCHARF
Research Engineer
Dresser Industries, Inc.
Bradford, Pa.

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ANNULAR members frequently form an important constituent part of the design of almost any type of machine, and their fabrication necessarily poses a number of problems. Small rings may be produced by a number of alternate methods. Among these are casting, forging, blanking from plate and machining from tubular stock. The cost of these rings will vary greatly between the various processes, depending upon such factors as the quantity made, the degree of tooling, the scrap loss and product design.

In the medium sized rings, there is a further choice of processes, such as torch cutting from plate, forging from billet, and roll bending and flash welding. Each process has a critical point at which an optimum ring may be produced. As the size and shape of ring section changes, it is evident that one process will replace another from mechanical or economic considerations. As rings become larger, more expensive equipment and greater tooling investment is required. Consideration must also be given to the cost of the final ring in the light of material waste, speed of manufacture and material handling problems.

To produce large rings therefore, the processes used for producing the small rings must be modified, and as the ring sizes increase, the processes useful for medium sized rings are placed under severe limitations. For instance, the blanking and torch cutting of large rings becomes uneconomical, due to the scrap lost in the corners and the center portions. Expensive equipment accompanies other methods such as die forging of large rings. Roll bending and flash welding, however, will usually be found to provide considerable economy. It is essentially a high production method, and when quantities are sufficient to justify line production technique, worthwhile savings may be expected.

Essentially, this process consists of roll bending or forming plate or bar into a circle of the diameter and curvature desired in the finished ring. The formed sections are then butt-flash welded together to form a continuous ring. The welding operation is followed by one or more sizing or stretching operations which insure diameter, roundness and flatness. In making rings by this process, accuracy within close tolerance is assured. Octagonal shapes as shown in fig. 1, or nonuniformly shaped sections, may likewise be made by this same general process.

Because of the possibility of obtaining a high degree of accuracy in the ring dimensions, this process effects a distinct saving in the material cost of large rings. Close tolerances in out-of-roundness, flatness, section and diameter combine to reduce the material weight and the machining time.

To hold a rough ring within close limits might appear to be a costly operation, having very little bearing on the requirements of the ring. Actual practice, however, proves this feature to be a large economic factor directly affecting the cost of the final ring, since the saving in both material and machining time is considerable.

The use of alloys of steel or of nonferrous metals

TABLE I

Composition of Readily Weldable Stainless Steels

	Type 316	Type 317	18-8 Mo*	Modified Alloy
Carbon	0.09 max	0.09 max	0.10 max	0.08 max‡
Chromium	16.0 to 18.0	18.0 to 20.0	17.0 to 19.0	17.0 to 19.0
Nickel	14.0 max	14.0 max	8.0 to 11.0	12.0 to 14.0
Sulfur	.....	.....	.....	0.04 max
Molybdenum	2.0 to 4.0	3.0 to 4.0	.....	2.0 to 2.5
Silicon	.....	.....	1.0 max	.....
Phosphorus	.....	.....	.....	0.04 max
Manganese	.....	.....	2.0 max	1.5 to 2
			*Ti = 4xC	‡Aim at 0.07 C

Steel Turbosupercharger Rings

presents a limiting factor in the processing of rings. Stainless steel and bronze are not easily processed by flame-cutting, as an example, and in its place may be substituted sawing or blanking. The roll-bending and flash-welding process, however, being adaptable to produce rings from the medium size to the largest, is also suitable for alloy steel rings,[1] and is being widely used. Rings made from nonferrous metals are also being produced with considerable success.

[1] *This process is discussed in an article by the author, entitled "Flash Welding Alloy Steel Rings,"* THE IRON AGE, *Aug.* 16, 1945.

Metallurgical examinations of flash-welded rings clearly indicate the excellence of the union of the bar ends. Because of the large range of control in this process, most metals may be flash welded, and due to the possibility of close adjustments in line production, a uniform product is assured. Mild steel rings and most nonhardenable metals require no treatment at the weld zone. Air-hardenable steels may be heat treated as an integral part of the process. Rings requiring special treatments to provide suitable grain structure, such as to restore corrosion resistance or a specified hardness, may be heat treated in the regular manner.

Laboratory tests made on stainless steels have proven the weld strong and ductile. The material of the types shown in table I welds satisfactorily and is suitable for fabrication into rings. It must, however, be stabilized. During the welding operation and sometimes due to service requirements, the ring may be subjected to temperatures that exceed the critical temperature range. Such temperatures in unstabilized steel will allow intergranular corrosion.

Columbium or titanium bearing steels, therefore, are usually specified for this process. Because of low carbon content, the added stabilization and treatment given this steel leave it untransformed and the carbides are completely dissolved. The columbium and titanium, through their high affinity for carbon, do not form carbides on the crystal interfaces. The iron and chromium, being robbed of their supply of carbon, are consequently limited in their ability to form carbides. This steel is annealed to allow the coagulation of the carbides within the grain boundary. The resulting small grain size further decreases the tendency for intergranular corrosion. The small crystals offer larger exposed surface per unit of volume, which the carbide must envelope before it effectively weakens the steel to the attack of corrosion.

This stabilized steel is highly resistant to corrosion and therefore suitable for use in turbosuperchargers. It withstands repeated cycles of heating and cooling, retains high strength elevated temperatures, has negligible grain growth, good aging characteristics and resists the abrasion of hot gases.

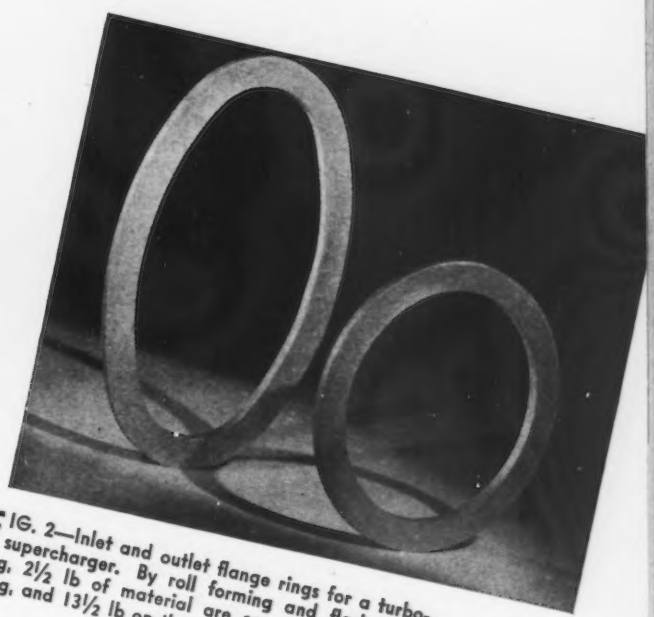

FIG. 2—Inlet and outlet flange rings for a turbosupercharger. By roll forming and flash welding, 2½ lb of material are saved on the round ring, and 13½ lb on the elliptical ring, over blanking from plate.

Stainless steels of this type flash more rapidly than mild steels during the welding cycle, and it is desirable to follow the flashing period with a sharp upset. Critical adjustments in the number of cycles of upset heating are also required. Throughout the welding cycle the accuracy of the welder control is essential for consistently good results.

As an example of producing medium sized rings with the roll-bending and flash-welding processes, the inlet and outlet flange rings, fig. 2, of a turbosupercharger are made with great economy over the former blanking method of production. These rings are cited because they show how smaller rings of alloy steels may be fabricated by the subject process at a fraction of their former cost. This process saves 2.44 lb of raw material in the round outlet ring that now weighs only 0.96 lb. A still greater saving in expensive and critical alloy results from the fabrication of the elliptically shaped inlet ring. Approximately 16 lb of plate material is required for blanking, whereas only 2.4 lb of bar stock is used to roll bend and flash weld the ring. A material saving of 13.6 lb is thus realized. The accuracy of the above two rings effectively eliminates machining of surfaces, and more than two rings are produced for the price of one made by the previous blanking process.

Fig. 3 illustrates a cutaway view of the turbosupercharger unit. The relative locations of the various rings used in its fabricated assembly are inlet flange ring A, outlet flange ring B, and the outer diaphragm ring C.

The outer diaphragm ring was previously forged

from a billet weighing in excess of 50 lb. The billet when forged was reduced to a weight of 45 lb. To produce a finished ring the 45 lb forging was then rough machined all over and finished machined to a weight of 16 lb. For interpretation of this material lost, the shaded portion of fig. 4 is shown. The original forging is shown at A, and the final finished ring at B. In producing a forging in this material, the excessive material is necessary and represents a factor of safety to lessen the dangers of cracks in the ring surfaces. Many forgings were rejected as being unacceptable when inspectors found such cracks before actual machining.

Cost reduction engineers proposed using a bar 1¼ in. sq, roll bending to a circle and flash welding into a ring. This ring was then to be used as a blank for die forging to the size approximating the rough machined ring. By this expedient, the method was estimated to produce a 50 pct saving in scrap material over the original forging.

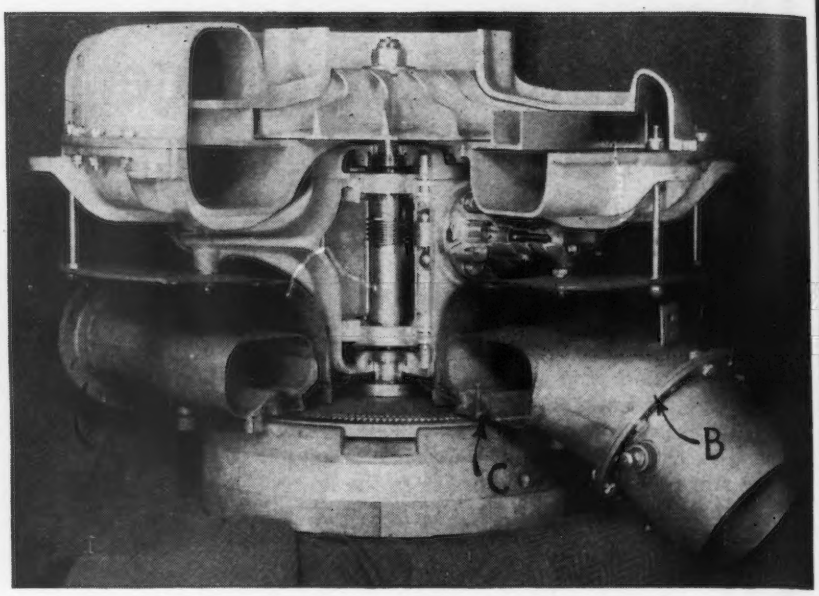

FIG. 3—Cutaway view of a turbosupercharger unit showing the location of the inlet flange ring at A, the outlet flange ring at B, and the diaphragm outer ring at C.

At this time, the turbosupercharger diaphragm outer ring was submitted to the engineers of the Dresser Mfg. Div. for study. A counter proposal by Dresser, which was accepted, resulted in producing rings at a saving of approximately 34 lb of material. The process also completely eliminated the rough machining operations and reduced the extent of finish machining on the ring. The ring produced by the roll-bending and flash-welding process is shown in fig. 5 at B, with the original forging at A, and the final ring at C. The shaded portion represents the saving in material and consequent machining time.

This outer ring represents a number of interesting sidelights in the development of a project and in the problems that are not usually encountered in regular ring manufacture.

To manufacture this ring with the greatest economy in material and to produce a satisfactory ring, a specially shaped bar section is used. This stock in quantity production is made inexpensively and held to unusual accuracy. The material is a modified austenitic Ni-Cr-Mo stainless steel, referred to in table I as Modified Alloy. The steel of this grade had never before been rolled into bar having such thin sections, acute angles and small radii. The alloy division of a leading steel mill produced this special bar section after skillfully mastering the cracking problem and produced bars which are of major importance to the final ring.

Billets of alloy steel are heated and rolled in successive stages until approximately a 3-in. square bar is obtained. During the hot working of this material, the surfaces become cracked or severely checked. The cracks are chipped out clean before the next stage of rolling is attempted. In the final rolling stand, the section is rolled to the size and shape desired and is free from cracks. Thus a bar that is free from cracks may be rolled bent and flash welded into an equally crack-free ring of a difficult section.

After machine straightening and pickling, the specially shaped bars are inspected. Each bar is checked to insure proper removal of cropped ends, the removal of overfill, and to make sure that no nonmetallic inclusions appear in the surface, and that all dirty steel is cropped out. The bar sections are gaged to insure size within tolerances on all the critical dimensions. Finally, the bar is inspected for general appearance, which includes nicks, burrs and cavities, so that bars containing imperfections do not pass into the production lines.

The analysis of each melt of steel is made at the ladle and recorded with a heat number. The percentages of all significant alloying elements are reported on chemical analysis forms and are certified for government records. This alloy is made by the electric furnace process and has superior qualities at elevated temperatures. In service, the steel retains its high strength, toughness and resistance to creep. For use in the diaphragm outer ring, it displays an unusually high corrosion resistance, especially free from hot gas abrasion, pitting and scaling.

In the Dresser plant the bars are sheared to calculated length in a mechanical press. The shear blades are specially designed to follow the contour of the mill rolled bar section, and to produce a minimum of distortion in the sheared bar ends. By maintaining this profile in the bar, a subsequent straightening operation is unnecessary. The sheared length of bar when roll bent, produces a ring of the desired diameter. This length is calculated by using the mean circumferential length of the ring, the amount of burnoff during welding, and the differential in length due to rolling and stretching.

Pyramid type roll-bending machines are used in forming the bar sections into a circle. The section, fig. 6 insert, is rolled substantially edgewise in producing the outer ring, fig. 6. Bending rolls are designed specially as to contour, and formed in such a way that the bar is supported and stability against collapse is assured. Because this material is quite strong and the bending is done edgewise, a high order of strength is required in both the roll-bending machine and the bending rolls.

End portions of the circle are straight as they leave this type of bending machine. Care is therefore taken in dickering or forming the ends of the bar to conform to the curvature of the ring. Dicker dies of special design are used in a mechanical press to perform this operation. A minimum of distortion in the bar ends and close conformity to the true circle previously formed is thus accomplished.

From the dicker press the shaped circle is ready for welding into a ring. The bar ends are accurately abutted at this point in the process and held in light contact. Substantially uniform rings with a minimum of offset result from careful clamping in the welder dies.

The welding operation consists essentially of placing the formed bar in position in the welding dies of a suitable welding machine. Best results have been obtained by using a welding machine of the type known as a resistance butt-flash welder. Fig. 7 shows a welder of this type used for rings of a larger size.

FIG. 4—Cross-section of a forging for a diaphragm ring showing the original forging at A, and the finished ring at B.

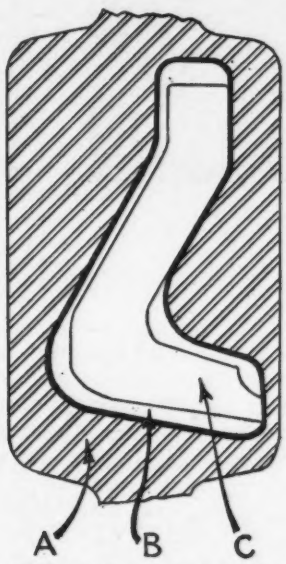

FIG. 5—Comparison of the material required in producing a diaphragm ring. The original forging is shown at A, the roll formed and welded ring at B, and the final finished ring at C.

The portions of the bar near the ends are ground clean of mill scale on the side surfaces that make electrical contact with the lower welder dies. Preparation of the end surfaces of the bar is not of special importance as all irregularities are burned off during the flashing period, and all foreign matter is expelled in flash. It is, however, desirable to have a slight bevel or chamfer condition at the meeting of the two end surfaces to improve the initial flashing. The welding dies are operated hydraulically, or otherwise grip the work, and move the ends of the ring toward one another during the welding operation.

The flash welder has alligator type holding dies specially designed to clamp the ring in a horizontal plane, to maintain the contour and the curvature of the ring when welded. The upper dies match the contour of one side of the bar section and the lower dies are contoured to fit the surfaces of the lower side. The ring is clamped in place tightly to prevent slippage during upset and to make good electrical contacts while the welder is in operation.

The welding dies are shaped to conform at least approximately to the curvature of the welded ring so that the rings, when welded, have a minimum of distortion and locked up residual stresses. The lower dies are formed of copper alloy to provide high electrical conductivity and to enhance the cooling of the electrodes. All electrodes and die holders are water cooled. The upper dies or gripper dies are made of tool steel and are serrated to prevent slippage of the bar at the moment of upset. Current is supplied to the lower welding dies through suitable conductors.

The welder is operated with a quick upsetting motion at the end of the flashing period. Tests made at various speeds of upset show that an unsound union results if the upset is too slow or too rapid. The welding schedule must be adjusted for each material composition and for each sectional area and shape. Precise control of the flash-welding operation is preferably effected by means of an automatic electronically controlled mechanism to assure consistent accuracy in results and high quality welds.

The welder capacity must be high to successfully weld this material and to produce consistently good welds. The welder dies, to take this severe burden, must be generous in size, maintained in good condition at all times and must be kept clean. Mill scale and grit on the dies will cause poor electrical contacts with the ring.

Because of the high current draw across the contacts, a fouled die will accumulate foreign matter until burning of metal takes place. Both the die and the ring burn in this instance. The seriousness of this fault cannot be overemphasized because a burned ring is a scrapped ring. Burns occur under the die, well back from the weld area, and are usually quite deep. When fouled dies are allowed to occur, it is best to replace them with a spare set while the original set is reworked. Stainless steels are particularly susceptible to burning, but when dies are maintained free from accumulation of dirt, and proper clamping pressures are maintained on the work, a great number of welds may be expected between renewals.

The flash-welded ring has high strength and good appearance. Representative pull tests in the annealed test specimens are given in table II.

When rings are machined, visual evidence of the

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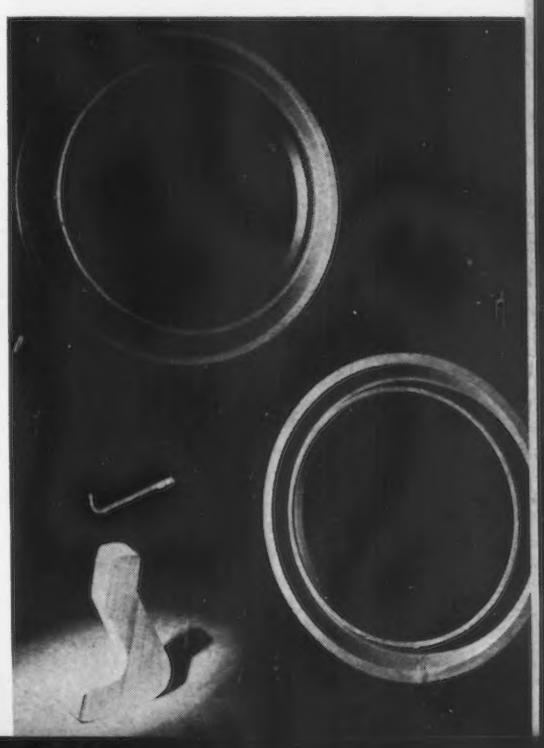

FIG. 6—Front and rear views of a formed diaphragm ring, showing (insert) a section of the specially rolled bar from which it is made.

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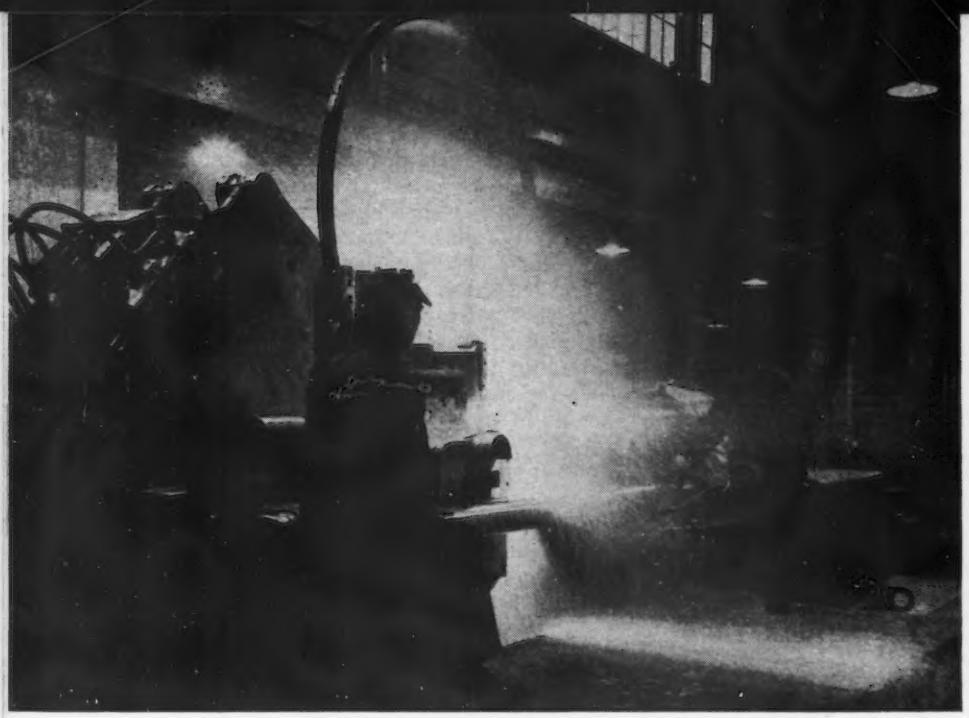

FIG. 7—Typical flash-butt welder as used for the production of roll-formed and flash-welded rings in the larger sizes.

weld is not present. Photomicrographs show no segregation of the alloys or of the carbides in the weld zone. Since the carbide is well combined, there is no tendency for intergranular corrosion in later service.

The flash from the weld and the upset metal are removed with chipping hammers. Automatic removal of the flash is not readily adaptable to this ring, because of its contour. The operation is therefore largely manual and requires exceptional care on the part of the operator to insure against undercutting the surface, especially in the concave portions of the section. Special shaped chipping tools are used for rapid removal of the material that lies in the elbow of the section. The material is nonhardenable so that the chipping is done cold, and with a sharp chipping chisel, a clean cut can be produced. After chipping, the weld area is ground smooth and level with the original surface.

All foreign matter, such as oil or lubricant, is removed from the ring by shot blast cleaning immediately before annealing. Annealing after cold working of stainless steels produces the final metallurgical condition in the steel. A gas-fired rotary hearth furnace is used to bring about a uniform heating of each ring. The annealing temperature for the steel ring is 2100°F and the furnace is regulated to within ±25°F. The rings are rapidly brought through the critical or carbide precipitation range in temperature during the heating cycle and thoroughly soaked at the annealing temperature. By using the rotary furnace, each ring is withdrawn at the same temperature, which insures uniformity of treatment.

It is significant to note at this time that the annealing of these rings is divided into a heating stage and a cooling stage. Between these two stages is inserted a press operation that utilizes the heat of the rings. A special die, operated in a hydraulic press, is designed to semi-coin the heated ring. The purpose of this operation is to size the ring hot, to flatten, and to correct any bent or distorted surfaces. During the imprint of this die, the hot rings drop slightly in temperature. The temperature is, however, over 1800°F as the ring leaves the dies.

To complete the anneal of this steel, the rings are removed from the dies and allowed to cool in still air until black, after which they are stacked and allowed to attain room temperature before shot blasting for final appearance. By utilizing the interrupted cooling cycle, the proper structure of the steel and the correct sizing of the ring are produced. The anneal given to stainless steel after welding and plastic deformation is essential for producing the best corrosion resistance.

The outer rings are 100 pct inspected. It is necessary to manufacture these rings with complete freedom from defects such as cracks, seams, folds and fissures. Final inspection consists of passing go and no-go gages over all surfaces with controlling dimensions. The flatness of the ring must be within 0.015 in. as determined by feeler gage while resting on a surface plate and must be free from thin spots, indentation and bent surfaces. The weld area must be strong, free from cracks, flaws, folds and must be of full section.

Probably the most outstanding benefit is the greatly extended range of sizes that may be produced economically. Economic importance also attaches to the extreme flexibility of control in each step, the use of standard or special shaped bars, and attainment of the accuracy necessary to allow material and machining operation savings in the final ring. Where possible, the advantage of making rings by the cold process eliminates furnace heating costs and increases the tool and die life expectancy.

The process as described is not new in the industry. It has been expanded considerably in recent years to include rings, not only of mild steels but also a range of alloys such as SAE 4140, SAE 4340, SAE 52100, bronze, aluminum and other metals. The experience in roll-bending and flash-welding rings has proved itself in production line operation where its costs are at a minimum and control and accuracy are of greatest importance. The process is highly competitive with other methods of ring making and has the additional advantage of producing rough rings that closely approximate the final dimensions.

TABLE II

Physical Properties of Welded KA2SMO Modified Steel

Specimen Number	Yield Strength psi	Ultimate Strength, psi	Elongation in 2 in., pct	Reduction of Area, pct	Remarks
1	62,420	84,925	4.6	44	Angular Cup. breaks in parent metal
2	60,606	85,787	45.3	41	Angular Cup. breaks in parent metal

Iron Substitutes in Openhearth Charges

Use of iron substitutes, always of importance to the small cold-metal openhearth shop, has received considerable consideration of late, due to the shortage of pig iron. In this critical review of various carbonaceous materials available for the purpose, the author also discusses the successful utilization of a combination of anthracite coal and byproduct coke.

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By R. R. FAYLES

Assistant to Openhearth Supt., Lukens Steel Co., Coatesville, Pa.

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ONE of the most important problems facing the operator of a cold-metal openhearth shop is the selection and proper use of a carbon-bearing substitute for iron on high-scrap heats. The ultimate aim of the cold-metal shop is to eliminate the use of iron entirely, so as to take fullest advantage of the cost differential between steel scrap and iron. Normally, however, such a practice increases operating expenses to such a degree that overall costs are actually higher with the all-scrap charge. As a result, the shop will try to find the "break-even" point on iron percentage and endeavor to operate as near to that level as raw material supplies will allow. Obviously, the lower the "break-even" iron percentage, the lower will be overall costs. The selection and use of the iron substitute has a great bearing in determining the optimum iron percentage on high-scrap heats.

There are several materials that are normally used to make up the carbon deficiency of high-scrap, low-iron charges. They include anthracite coal, river coal, byproduct coke, petroleum coke, and some commercial products especially prepared for this service. The main requirements for the successful iron substitute are (1) high carbon content, (2) low sulfur content, (3) consistent carbon recovery efficiency, (4) nonfoaming characteristics, and (5) low cost. None of the foregoing materials fulfill all the requirements and failure to follow a regular schedule in furnace operation may further distort their defects. Every effort must be made to determine the best material and proper use for a given shop and to follow rigidly the pattern set up for this type practice. Failure to do so may result in long heats, short campaigns and high fuel consumption on high scrap practice.

Anthracite coal has been used chiefly in Eastern openhearths due to availability and comparatively low cost. The coal should be of rather large size (egg-sized material is popular) and should be washed to insure maximum cleanliness. This type coal is normally low enough in sulfur to suit basic openhearth operation, although it should be frequently checked. It usually runs quite uniform in sulfur content if all the coal is supplied from a particular mine or district, and every effort should be made to obtain it on this

basis once a good source has been established. Anthracite coal imparts its carbon to the bath consistently and the efficiency of carbon recovery remains fairly constant even when charging times vary widely. This is extremely important, since current scrap quality makes it impossible to maintain any regularity in the charging cycle. However, anthracite coal has one serious drawback that tends to limit the amount that can be used. It contains an appreciable amount of hydrogen that is rapidly liberated when the coal is heated to approximately 2000°F. This gas is evolved faster than it can be passed up through the molten metal and slag, which causes rather violent foaming of the bath. This foaming retards the progress of the heat and will substantially increase heat times. This reaction can be minimized by using proper charging technique. One method is to charge the coal rather late in the scrap charge and delay the iron finish until the coal has floated to the surface and dissipated its gas. This will eliminate foaming but will lengthen charging time and, consequently, heat time to some degree. This practice also increases the danger of refractory damage, since the floating coal will form an incandescent surface layer that reflects tremendous amounts of heat. When this type charging is followed, the first helper must carefully observe the furnace during the period when the bath is sealed over with coal. It is also possible to reduce foaming from coal by scattering the coal through the charge and allowing the gas to be liberated over a period of time rather than a sudden evolution. This practice will entail care on the part of the scrapyard to make certain that the proper amount of coal is used on all heats and increases the yard shifting necessary to load heats completely.

River coal is the very fine anthracite that is washed down from the mines and reclaimed by a pumping operation at some downstream point. The coal contains considerable ash content and its fine particle size tends to promote bath foaming. It is not a particularly good iron substitute, but its extremely low cost makes it attractive. This is especially true in the Harrisburg area where it has found its widest use. It can be used in relatively small amounts, but it is not practical to use when operating at very low iron percentages.

Byproduct Coke

Byproduct coke finds rather wide use as an iron substitute due to its availability in most steelmaking areas. It compares favorably on a cost basis and normally works quite well on highscrap heats. The coking operation drives off the volatile gases from the coal and leaves principally carbon and ash. Consequently, there is no gas evolution from coke in open-hearth charges and very little foaming will be experienced when it is used in high scrap heats. However, byproduct coke does not give consistent melt carbons, being highly responsive to variations in charge times.

A delay in charging will normally give a soft melt heat unless additional iron is charged, which is highly undesirable in shops that are particularly interested in conserving iron. This type coke is also very irregular in sulfur content and must be closely watched to avoid trouble with high sulfur heats. It is not uncommon to find byproduct coke with as much as 1.50 pct sulfur, which, in conjunction with a high-scrap charge, can cause serious difficulty.

Petroleum coke is a low sulfur product that commands a price extra for its purity. It will normally contain about 0.35 pct sulfur, which makes it readily adaptable to acid furnace practice where the sulfur content is more critical than in basic practice. It usually takes the form of rather large, porous lumps and works very well in high-scrap heats. However, it is subject to the same difficulty as is found with byproduct coke; that is, changes in charging time cause wide variations in melt carbons. This premium product is not really essential in basic heats, unless an extremely low iron percentage is used and scrap quality is especially poor with regard to sulfur.

Special iron substitutes, principally graphite and a specially prepared coke material, are high in carbon and very low in sulfur. They work quite well on most high-scrap charges, and, because of their purity, practically eliminate bath foaming. However, they are quite expensive, usually costing from three to six times as much as the more common iron substitutes, coal or coke. It is difficult to show sufficient saving to warrant their use in ordinary basic high-scrap heats. There is no question that they effectively solve many of the problems of high-scrap practice, but it will be an unusual case where some experimentation will not give just as good an operation with one or more of the common iron substitutes. These special products are especially well suited for acid furnace practice and in quality steelmaking operations.

Miscellaneous Materials

There are other miscellaneous carbonaceous materials that are used as iron substitutes such as broken carbon electrodes and midwestern and southwestern coals. The electrodes are high purity material and are normally consumed in some electric furnace operation. The interior province coals are usually high in sulfur and ash and must be carefully selected.

The carbon-recovery efficiency of all the various iron substitutes will vary somewhere between 50 to 75 pct. The recovery will normally be dependent on (1) position in the charge, (2) type and size of material, (3) furnace condition, and (4) charging cycle. However, some iron substitutes have inherently better carbon transfer properties than others. For instance, 100 lb of anthracite coal will replace more pig iron than 100 lb of byproduct coke, even though the coke contains more carbon. It is not known exactly why this difference exists, but it is possibly due to some difference in carbon formation or structure. Normally then, 100 lb of carbonaceous material plus scrap will replace from 1000 to 1500 lb of pig iron in the open-hearth charge. It is always necessary to do some experimenting before the definite proportion to give the proper melt carbon on a given furnace can be determined. Even then, some allowance must be made for changes in scrap quality, iron analysis, or any other factors which might tend to vary the melt carbon. Operating personnel must be alert to such changes and regulate iron percentage accordingly. It is customary to use full charging pans of carbon material and to adjust iron percentage to meet conditions.

It was noted previously that all of the iron substitutes have certain disadvantages either from an operating or cost standpoint. However, a practice has been developed which uses anthracite coal and byproduct coke in combination, taking fullest advantage of their desirable properties, yet minimizing their defects. It was determined that there is a definite limit to the amount of anthracite coal that can be charged on high scrap heats without causing undue delay and

wear on the furnace. Even then, the coal must be charged at or near the top of the scrap charge in order to keep from foamy heats. Byproduct coke (low in sulfur) can be charged in almost any quantity without materially affecting the heat, although its carbon recovery is affected by changes in charging times. The combination anthracite coal and byproduct coke charge was set up on the following basis.

From the known iron percentage level and the previously determined optimum coal weight, the amount of coke necessary to give the desired melt carbon was estimated. The coke was charged directly on the lime, while the coal was charged with the last scrap and spread across the center of the charge. When this charge had melted sufficiently to have the edges of the bath open and active, the iron finish charge was added at the end doors. This made certain that the fast melting iron would have molten metal ready to receive it and that the chilling effect of the cold iron would be minimized. This type charge has worked very well on 12 pct iron heats and has been used successfully on heats with no iron at all. No foaming has been observed and melts have been quite consistent. With coke forming a considerable portion of the carbonaceous charge, gas evolution is small, while the presence of the anthracite coal offsets the effects of changes in charging time. Carbon is provided for both the top and bottom of the charge and helps heats to work actively during the melting period. The cost of the iron substitutes is small and a relatively low cost raw material charge can be developed with its use.

The factors of furnace design, fuel practice, type of product, and other variations in openhearth operation make it impossible to arbitrarily set up the best iron substitute on high scrap heats for a given shop. The successful solution of the many problems arising from high scrap operation will become more imperative for the cold-metal producer as markets become more competitive and costs become more critical. Each shop must determine the iron substitute material and method of application that will produce most efficiently and cheaply in its own operation.

Flash Welding Submarine Pipelines in Operation Pluto

STILL ranking as one of the most extraordinary engineering achievements of the war, the laying of pipelines under the English Channel (Operation Pluto) presented some interesting problems in fabrication. A discussion of this operation has been published recently in Sheet Metal Industries, London.

When in 1942 the suggestion was proposed, it was evident that the problem would be very complex. Not only was it necessary to consider the type of joint required, but the method of laying required new methods to be developed, particularly since each line had to be laid in a single night.

Numerous experiments were made to determine whether ordinary 5 swg mild steel pipe 3½-in. OD could be successfully handled, using drums approximately 40 ft in diam. Eventually it was decided that the pipes should be joined together by means of flash butt welding, lengths of 4000 ft being made from 40-ft lengths.

Special plants had to be built for making the long lengths of pipe. Two exactly similar plants were laid down side by side, each having seven welding lines consisting of a flash-welding machine and also apparatus for removing the internal and external flash after welding, a traversing machine for moving the pipe longitudinally and a 4000-ft long roller trough on to which the completed pipe was fed. Forty ft pipes made in other plants and also some 20-ft lengths were delivered to the welding plant, and after being cleaned and inspected were flash welded end to end, the internal fin being removed by a rotating tool which, on being retracted from beyond the weld and out through the open end of the pipe, cut off the fin and blew back the swarf and spattered metal. After removal of the outside fin by a rotary cutting machine, the pipe was pushed by the traverser into the roller trough. In this way pipes 4000-ft long were built up, care being taken to reproduce identical welding conditions on every occasion, and for this, special electrical and pressure-recording devices were designed to check the consistency of the welding machines. In addition, welds were frequently cut out and tested.

After a full length had been made it was necessary to offload it from the trough to the storage rack alongside, from which it was later drawn for the final coiling. This offloading was most spectacular, since, by merely dropping one end of the pipe from the trough on to the storage rack, a wave of pipe was made to travel at some 120 mph along the 4000-ft trough, causing the pipe to leap from trough to rack.

Another welding machine joined together the 4000-ft lengths as they were wound on to the drums. The internal flash of these welds could not be removed.

Six drums were made, each being a huge hollow bobbin 90-ft long, 50-ft in diam over the flanges and 40 ft over the center part on which the pipe was wound. Each drum carried over 80 miles of pipe in one continuous length, and when fully wound weighed 1600 tons. After launching, the drums were fixed into swinging arms attached to a jetty, the continuous length of pipe being wound on by rotating the drum by means of special winches driving it through link chains running on the periphery of the flanges.

In order to prevent water being entrapped between the many turns of pipe on the drum, it was necessary to space each turn about ¼ in. from its neighbor, and this was carried out by clipping hoops on to the pipe at about 10-ft intervals as it was being wound on.

After winding, the full length of pipe was tested and flushed out with carbon dioxide which, being soluble in water and gasoline, prevented the formation of air locks, and the drums were towed to the points from which the pipelines were laid to France. The drums, of course, floated freely in the water and revolved as the pipe was laid.

In all, about 1000 miles of steel pipelines were made and eight lines were laid. These, in conjunction with similar pipelines made from hollow lead cable, carried over 1 million gal of gasoline a day across the Channel. The steel pipe which was used was produced in the normal way. No special material or special methods of manufacture were employed although, for this undertaking, where failure of a weld or pipe would be so serious, the inspection was unusually rigorous.

Deep Fillet Gas Welding

A cost saving technique of gas welding known as deep fillet welding was developed in Germany during the war and met with considerable success. A description of this process, translated from a discussion of the procedure published in Autogene Metallbearbeitung, follows.

MUCH attention has been given during the last few years to arcwelding processes or techniques that are known as or allied to the deep fillet welding technique. Up to the present time this so-called deep fillet technique has been applied exclusively to arcwelding in this country. A survey of various technical developments and literature published in European countries during the war years brings to light the following interesting new gas welding technique that utilizes the same basic theoretical principal of operation procedure as the metal arc deep fillet technique.

The deep fillet welding procedure permits the gas welding process to be used more economically than any gas welding practice known up to the present time. In addition, like ordinary welding techniques it can be used in the horizontal and vertical positions and in other difficult welding applications. This process does not require any different equipment than the ordinary methods in use at the present time and the welding is performed by one operator only, from one side of the work. As to the ductility and tensile strength of the resultant welds, these prove to be of a more satisfactory nature than when other gas welding techniques are used.

Regardless of what process of gas welding is considered the heat of the flame is transmitted to the surfaces of the joint by conductive connection and radiation as shown in fig. 1. The transmission of heat by conduction is controlled by the movement of the flame along the joint surfaces and in the movement of part of the resultant temperature to colder areas. This conduction is greater wherever the gas flame is closest. The best welding method is, therefore, one in which the hottest part of the torch flame is adjacent to the joint edges.

The transmission of heat from the flame to the joint edges by means of radiation is proportionate to the power of the temperature of the radiating area of the flame, and decreases proportionately as the distance of the flame increases from the joint.

The hottest zone in the flame lies in and close to the flame cone. It is clear, therefore, that to obtain the greatest possible heat effect on the surfaces, the flame cone must be situated as near as possible to them, and in doing this, the time required for heating the joint surfaces up to the fusion point will be proportionately shorter.

To secure the rapid, efficient melting of the filler metal, the proper effect of the flame on the welding wire is necessary. For this reason the hottest part of the flame must be held close to the wire to obtain optimum results. The end of the wire which is to be melted is, therefore, to be brought as near as possible to the flame cone. The time required for the fusion of the filler metal will always be shorter if only a small quantity of filler metal has to be deposited in the joint.

From this it can be seen that an economical welding technique must have the proper interrelationship of the flame, welding wire and joint surfaces. In addition the opening between the plates must be as small as possible so that the quantity of filler metal required may be reduced to the minimum.

For successful gas welding of any kind it is important that the base edges of the joint be brought to fusion temperature and a small hole be kept open

FIG. 1—In conventional welding the edges of the work are beveled, tending to cause a concentration of heat at the sharp edges of the joint. Furthermore, the ability of the flame to pass through the opening decreases in direct ratio to the angle *V*.

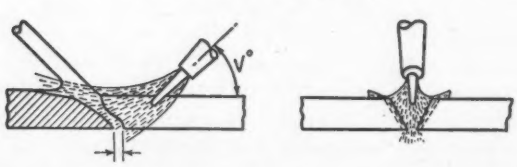
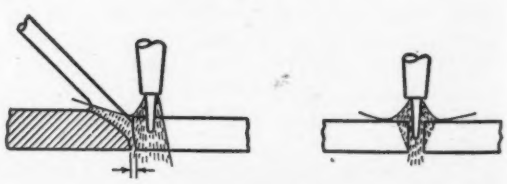
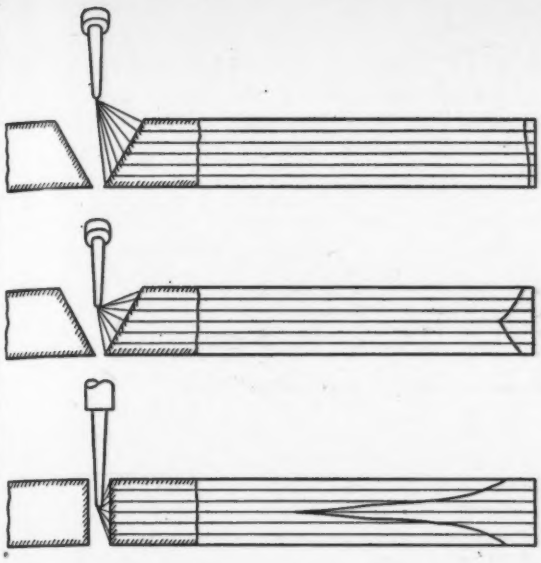
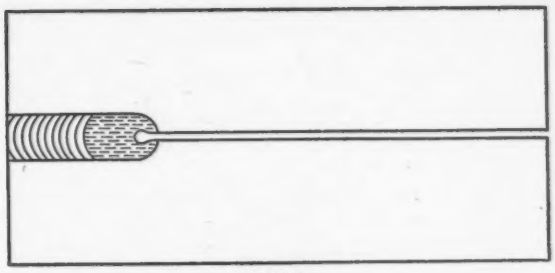


FIG. 2—In deep fillet welding the edges are square, resulting in more even heat distribution, and the flame is held at 90° with the point half way through the metal thickness.







ABOVE

FIG. 4—For successful welding by the deep fillet method, it is necessary that the hole at the base of the joint be kept open as shown here.

LEFT

FIG. 3—Comparison of heat distribution with conventional and deep fillet gas welding techniques.

under the flame which shows that the base edges are molten. To facilitate this condition, the technique now in use recommends the beveling of the edges of heavier gage materials as shown in fig. 1. This procedure, in one way, gives the flame free passage through the joint. On the other hand, it concentrates the heat upon the sharp edges at the base of the joint making them melt quicker than if they had not been beveled. The question arises as to whether it would be possible to obtain easy passage of the flame and at the same time to secure adequate heating of the base edges by means of another procedure other than beveling the edges of the base plates. It has been shown above that melting of the edges of base material is obtained if the flame is allowed to send the greatest possible amount of heat through the joint. The flame portion which does not pass through the joint must be sufficient to protect the welding surfaces as well as the adjacent area of the work pieces from the air. In other welding techniques, for example the usual system shown in fig. 1, the flame is divided and held under a certain angle of inclination, *V*, to the surface of the base plate. This angle is generally 45°. In this case, the flame is spread as shown in the illustration. About half of the flame streams through the joint, the other half glides over the welding surfaces. Mathematically speaking, the ability of the flame to force its passage through a narrow slit depends on the pressure of the gas flow. A flame which has an inclination of *V* to the bevel is forced vertically through it at a pressure that is dependent upon the pressure of the flame, developed by its relative position to the joint. Consequently, the ability of the flame to obtain passage through the plate opening decreases in proportion to the increase of the inclination, that is, as angle *V* decreases.

Disadvantages of Beveling

It is logical therefore, that if it is necessary to obtain thorough fusion of the base edges with a narrow root opening, the flame must be directed vertically to the surfaces of the base metals, that is, the angle V must be 90°. This naturally shows that beveling is undesirable and, as shown in fig. 2, the point of the flame cone must be held a little below half way through the thickness of the base plates rather than above it, especially when thinner sheet material is being welded. This technique explains the term deep fillet gas weld-

TABLE I

Comparison of Time, Fuel and Wire Consumption in Deep Fillet and Conventional Welding

Plate Thickness, in.	Deep Fillet Technique			Conventional Technique		
	Welding Time, sec	Gas Consumption, cu ft per hr	Wire Consumption, oz	Welding Time, sec	Gas Consumption, cu ft per hr	Wire Consumption, oz
0.118	211	11.296	0.883	348	12.073	1.765
0.118	221	11.296	0.953	353	12.214	1.589
0.118	218	11.296	0.883	364	12.214	1.765
0.197	344	17.756	1.518	503	17.65	3.177
0.197	341	17.756	1.553	484	17.65	2.965
0.197	366	17.756	1.659	498	17.65	3.106
0.236	408	18.356	1.836	613	24.639	4.518
0.236	440	18.356	2.047	565	24.639	4.342
0.236	405	18.921	1.836	514	24.639	3.847
0.315	492	28.064	4.589	726	28.452	7.025
0.315	497	28.064	4.2	766	28.452	7.166
0.315	523	28.064	4.342	778	28.452	7.342
0.394	616	35.3	6.283	882	35.653	10.519
0.394	548	35.3	6.107	808	35.653	9.602
0.394	565	35.3	5.895	884	35.653	10.767
0.472	625	48.008	10.308	973	42.466	15.179
0.472	628	48.008	10.449	951	42.466	14.897
0.472	663	48.008	11.120	991	42.466	15.144

ing, which has been chosen to characterize the main principle of this method. The flame passes vertically between the parallel edge surfaces of the parts to be welded, and exerts much less heat effect on the surrounding zones of the base plates than in other procedures where the flame streams against the beveled edges. This means that the cooling of these zones is more rapid, which in turn results in higher strength properties. In addition, it also prevents the long exposure of the base metal to the heat effect of the torch flame, which would affect the tensile and ductile properties of the weld and would result in additional distortion and shrinkage. In conformance with the above advantages, the quantity of filler metal required for deep fillet gas welding is naturally much less than would be necessary for welded joints with beveled edges.

Mechanical Considerations

The question has been raised as to how it is possible to prevent the molten filler metal or the molten pool from running through, that is, from being lost through the root opening between the edges of the base plates. This danger is eliminated by the state of equilibrium which is the result of the convergent action of three forces: (1) Pressure of the gas flame; (2) weight of the molten mass; and (3) surface strength of this mass. The first two forces are directed downwards, the third is less in the deep fillet gas welding process than in any other procedure, since the weight of the molten metal is materially less, besides the root opening being narrower and the temperature of the adjacent zone consequently lower. The surface strength of the pool is sufficiently strong to resist the pressure of the gas as well as that of its own weight, so that it is able to counterbalance the pressure coming from above with the resultant equilibrium of forces, the horizontal components of the flame pressure preventing the molten metal from running thru the joint.

Operating Technique

To obtain the best welds the flame must be as thin and concentrated as possible, because in deep fillet gas welding it does not act directly on the molten metal but glides through the narrow root opening between the edges of the joint, its effect being due to the higher speed of its outer parts compared with the central one, which permits the use of flames with a higher pressure than in other procedures. This again makes it possible and even necessary for the operator to obtain a more active, hard flame for the same quantity of gas used. Fig. 3 gives a graphic representation of the differences in the heat radiation and the heated areas which must be taken into consideration when comparing the usual procedures with the deep fillet gas welding process. The right-hand section of the sketch shows the value of the flame power in the distance from the tip of the flame to the seven different points on the surface of the edges. This comparison demonstrates clearly the theoretical superiority of the deep fillet welding system above others. Practically, however, the difference is slightly reduced by the fact that in deep fillet gas welding too, the joint edges do not remain quite parallel, a slight beveling being always produced by the flame.

Care must be taken to keep the hole in the base of the joint continuously unobstructed when using the deep fillet gas welding process as shown in fig. 4. In adddition, the slightest difference of width of joint affects the operation. Too wide a joint results in unsuccessful melting of the base metal and the molten metal shows a tendency to burn through. When the space between the edges is too narrow, the molten mass on both edges is apt to fuse together under the effect of the flame, so that the best way is to hold the flame an equal distance from both sides. The root opening of the joint must be approximately equal to ⅓ the thickness of the materials to be welded. As to the pressures of the flame, the necessity of securing the greatest possible hardness of the flame has already been mentioned. This hardness must not, however, exceed a certain point, which would blow off the molten metal. In the case of vertical seams, that is, when the weight of the molten mass and the flame pressure are not working in the same direction, a slightly increased pressure is recommended.

Economical Advantages

The main characteristics of this method are rapidity of operation and lower consumption of gas and filler metal. To ascertain these economical advantages of the method, a number of experiments were made in which low carbon steel was selected as the base metal. The results of the experiments are shown in table I. This gives a comparative tabulation of welding time, consumption of gas, and weight of burned off wire, using the deep fillet and conventional gas welding procedures. The comparison proves conclusively the advantages of the deep fillet technique and shows that considerable economy with higher strengths and less shrinkage is obtainable.

Four years have elapsed since this procedure was first made public. During this period the deep fillet gas welding procedure has been found practical and advantageous. It is being used almost exclusively in various plants for all material up to ½-in. in thickness. It has been ascertained that deep fillet gas welding, as far as economy is concerned, bears out what laboratory results showed. One of the advantages has proved to be the appearance of the slightest welding defect on the upper or lower weld surface. This peculiarity induced various authorities to declare optional the x-ray testing for pressure vessels welded according to the new process.

Practical Applications

Many thousands of vessels of alloy steel with thicknesses varying from 1/16 to ¼ in. have been welded, and the welds show an extremely smooth and clear appearance on the root side. Not a single weld has fractured or broken in service, in spite of very high working pressures. Hundreds of acetylene tanks manufactured out of material ¼, ⅜ and ½ in. thick were deep fillet welded lengthwise, and in addition had two circumferential deep fillet welds. Less than 0.7 pct were found unsatisfactory. The operating factors necessary for success are: A good grade of gas, constant gas pressure, and the constant flow of oxygen and acetylene.

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10,000 Trade Names

. . . A fourth section section of the Trade Name Directory, compiled by The Iron Age as a ready reference for engineers and business executives, is presented herewith. The first section of this directory appeared in the Annual Review Issue of Jan. 2, p. 172; the second appeared Jan. 9, p. 65; the third appeared Jan. 16, p. 64. This directory tells what a trade name covers, its composition if a material, where or how it is used and the full address of the manufacturer or supplier.

Galahad: Rust and wear-resistant 17 Cr, 2 Ni type stainless for cutlery and general applications. Hadfield, Ltd., Sheffield, England.

Galco: Synthetic rubber for painting inside fuel tanks, etc., to seal leaks. Impervious to most solvents and wide temperature variations. Consolidated Vultee Aircraft Corp., San Diego.

Gallimore Metal: Complex Ni-Cu-Zn-Fe-Si-Mn alloy for airplane parts, stampings in marine service. W. Gallimore & Sons, Ltd., Sheffield, England.

Gallium: Pure Ga for optical mirrors, photoelectric cells, and electron tubes. Gerhard Wagner, 235 Broadway, New York.

Gallcar: 83 tin alloy for antifriction service. Chas. Carr, Ltd., Smethwick, Birmingham, England.

Galvalloy: Low-melting, corrosion-resistant alloy for protecting welded seams on galvanized steel and for repair of aluminum castings. Metalloy Products Co., 1353 E. 17th St., Los Angeles.

Galvamatt: Galvanized sheets for stoves, metal signs. Baldwins, Ltd., London, England.

Galvanealed: Specially processed non-spangled galvanized sheet that can be formed without injury to the coating and may be painted immediately. Carnegie-Illinois Steel Corp., Carnegie Bldg., Pittsburgh 30.

Galvanite: Hot-dipped zinc-coated hot and cold-rolled strip steel suitable for difficult rolling, forming, drawing or stamping operations. Sharon Steel Corp., Sharon, Pa.

Galvanized Paintgrip: A fully zinc-coated sheet with a mill-Bonderized surface treatment; permits immediate painting and prolongs paint life. American Rolling Mill Co., 303 Armco Ave., Middletown, Ohio.

Galvaprep: For treatment of all types of zinc-coated surfaces and cadmium-plated surfaces, to prepare them for painting. Neilson Chemical Co., 6564 Benson St., Detroit 7.

Galv-Weld: Materials and process for regalvanizing gas or electric welds in galvanizing iron and steel; fluxes for welding and brazing; hard-surfacing electrodes and aluminum solders. Galv-Weld, Inc., Spirea Drive, Dayton 10.

Garalun: Aluminum-oxide abrasive. Clover Mfg. Co., Norwalk, Conn.

Gasflux: Volatile flux, fluxer for entraining volatile flux in combustible gas fed to a torch; for fusing, brazing or cladding of metals. Automatic Gasflux Co., Public Square Bldg., Cleveland.

Gasid: Corrosion-resistant copper alloys with 9 Sn, 3 Zn or 7 Al, 3 Fe, for oil refineries in chemical industry applications. Scientific Alloys, Inc., Los Angeles.

Gastite: Seal for gaskets and pipe joints, insoluble in water and all petroleum products including gasoline. United Oil Mfg. Co., 1429-31 Walnut St., Erie, Pa.

Gathman: Steel ingot molds of special design. Gathmann Engineering Co., Baltimore 28.

G. Babbitt: Lead alloy with Sb, As, Sn for babbitts, bearings. Federated Metals Div., American Smelting & Refining Co., Perth Amboy, N. J.

Gearflex: Flexible couplings. Farrel-Birmingham Co., Inc., Ansonia, Conn.

Gear Grip: Firm gripping surface on Parker-Kalon socket screws. Parker-Kalon Corp., 200 Varick St., New York 14.

Gempco: Light-density (0.65) electrolytic powdered copper and compressed metallic friction materials. General Metals Powder Co., 130 Elinor Ave., Akron 5, Ohio.

Gem-Set: Diamond cut-off wheel which is made by a special method of affixing the diamonds into the periphery of a suitable disk. Bay State Abrasive Products Co., Westboro, Mass.

Genalloy: High heat and corrosion-resistant Ni-Cr-Fe alloy for cast furnace parts. General Alloys Co., 405 First Ave., Boston.

Genelite: Two types of synthetic bronzes for aircraft engine bearings. British Thomson Houston Co., Ltd., Rugby, Warwickshire, England.

Genesee: Series of heat and corrosion-resistant chrome-nickel steels for chemical engineering equipment and furnace parts. Symington Co., Rochester, N. Y.

Genex: Arcwelding electrode for steel; corresponds to AWS E-6012. Metal & Thermit Corp., 120 Broadway, New York 5.

Gensteel: Alloy steel castings. General Malleable Corp., Waukesha, Wis.

Genuine Glidden: Barbed wire. American Steel & Wire Co., Cleveland 13.

Genuine Silverine: Babbitt for bearings. Glacier Metal Co., Richmond, Va.

Geometric: Die heads, taps and machines for producing screw threads on a quantity production basis. Geometric Tool Co., New Haven 15, Conn.

Gibsiloy: Ag-Ni sintered powders and Ag-graphite mechanically processed compounds for electric contacts. Gibson Electric Co., 8350 Frankstown Ave., Pittsburgh.

Gibsiloy NW: Silver-nickel-tungsten, pressed and sintered; arc resisting with low contact resistance; heavy duty contacts for relays, motor starters, etc. Gibson Electric Co., 8346 Frankstown Ave., Pittsburgh 21.

Giderite: Metal fence posts. American Steel & Wire Co., Rockefeller Bldg., Cleveland 13.

Gifcoloy: Alloy cast iron. Gra-Iron Foundry Corp., Marshalltown, Iowa.

Gilbarco: Oil heating, gasoline handling and air-conditioning equipment. Gilbert & Barker Mfg. Co., W. Springfield, Mass.

Gilding: Brass with 5 Zn, little Pb-Fe; for jewelry and bullet jackets. American Brass Co., Waterbury, Conn.

Gilding Metal: Corrosion-resistant brass with 4 Zn for cheap jewelry. Chase Brass & Copper Co., Inc., Waterbury, Conn.

Gilmore Nickel Alloy: Nickel alloy for setting diamond tools, holders. Glacier Metal Co., Ltd., Alpertone, England.

Glass Sealing: Steel with 41.5 Ni for sealing into glass. Carpenter Steel Co., Reading, Pa.

Glastone: Masonry load-bearing unit faced with Vitrolite structural glass. Libbey-Owens-Ford Glass Co., Toledo 3.

Glidden: Barbed wire. American Steel & Wire Co., Rockefeller Bldg., Cleveland 13.

Glixey: Series of anti-friction metals for bearings. Die Casting Appliance Corp., Ltd., London, England.

Globar: High-temperature electric heating elements, fixed resistors and other products made of silicon-carbide grain formed into aggregates and bonded by recrystallization to yield non-metallic, refractory; especially adaptable to high temperature industrial applications. Carborundum Co., Niagara Falls, N. Y.

Globe: Brick for iron and steel ladles. Globe Brick Co., East Liverpool, Ohio.

Globe: Seamless carbon and stainless steel mechanical and pressure tubing; round, oval, square, rectangular and other special shapes. Globe Steel Tubes Co., Milwaukee 4.

Globe: Tumbling barrels, tool and battery boxes. Globe Stamping Div., Hupp Motor Car Corp., Cleveland 2.

Globeiron: Seamless pressure and mechanical tubing of high-purity ingot iron especially adaptable to fabrication into various tubular equipment. Globe Steel Tubes Co., Milwaukee 4.

Gloweld: Electric-welded stainless tubing furnished in either the "flash removed" or in the "as welded" condition with inside or outside or both surfaces ground and polished to various degrees of finish. Globe Steel Tubes Co., Milwaukee 4.

Glowray: Nickel-chrome-iron alloy for heating elements, furnace parts. Henry Wiggin & Co., Ltd., Birmingham, England.

Glyco: Lead-base babbitt compositions made in five grades—Turbo, Marine, Standard Heavy Pressure, Transmission. Joseph T. Ryerson & Son, Inc., Box 8002-A, Chicago 80.

Glycoseal: Flexible, leakproof and non-cracking compound for joints in pipes and containers carrying propane, pentane, butane, benzol naphtha, gasoline, grease and oils of all types. Glyco Products Co., Inc., 231 King, Brooklyn.

Glyptal: Alkyd-resin products. General Electric Co., Schenectady.

Goetzerit: Compressed asbestos sheet packing used to seal low pressure joints in water, oil, air, gas and steam lines where the use of metal gaskets is not required. Goetze Gasket & Packing Co., Inc., New Brunswick, N. J.

Gould: Industrial storage batteries. Gould Storage Battery Corp., Depew, N. Y.

G.P.: Finished bronze bearings. Johnson Bronze Co., 505 S. Mill St., New Castle, Pa.

Gravitygram: Predetermined weight scale. Toledo Scale Co., Toledo.

GRCO: See Steelklad.

Great Lakes Electrodes: Amorphous carbon and graphite electrodes for electrothermic and electrochemical processes. Great Lakes Carbon Corp., P. O. Box 637, Niagara Falls, N. Y.

Green Wabblers: Rolls for rolling mills. United Engineering & Foundry Co., First National Bank Bldg., Pittsburgh 22.

Greenerd: Arbor presses, manual and hydraulic. Greenerd Arbor Press Co., Nashua, N. H.

Griesheim: Welding-rod alloys. Griesheimer Autogen Verkaufs G.m.b.H., Griesheim, Germany.

Gohi Iron: Low-carbon iron for sheet metal construction work, roofing, pipe, ventilators. Newport Rolling Mill Co., Newport, Ky.

Golden: Core oil for foundry use. Certified Core Oil Div., Socony-Vacuum Oil Co., Inc., 3308 S. Cicero Ave., Cicero, Ill.

Gold Tip: Mn-S steel for screw-machine parts. La Salle Steel Co., 919 N. Michigan Ave., Chicago.

Goose Lake: Fireclay products. Illinois Clay Products Co., Joliet, Ill.

Government Genuine: High tin-base babbitt. United American Metals Corp., 200 Diamond St., Brooklyn 22.

Grac: Lead, hardened with Sn (10 pct) Cu, Sb, As, and Cd or Ni; contains graphite; anti-friction alloy which is satisfactory alternate for high-tin babbitt bearings. Graphitized Alloys Corp., 5 Beekman St., New York.

Grade-O-Metering: Instrument for measuring strength of bond of grinding wheels and honing stones. Abrasive Engineering Corp., Spring Lake, Mich.

Grainal: 25 V, 15 Ti, 10 Al, 0.2 B iron alloy used in steel manufacturing to increase hardenability. Vanadium Corp. of America, Bridgeville, Pa.

Grainal Alloys: Three intensifiers for increasing hardenability of steels and improving other physical properties. Vanadium Corp. of America, 420 Lexington Ave., New York 17.

Grainloy: Steel used for rolls for ferrous and nonferrous rolling mills. Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa.

Gramix: Cu-Sn-graphite finely powdered mixture for light machine bearings, bushings. United States Graphite Co., 1623 Holland Ave., Saginaw, Mich.

Granator: Electrical sheets containing 2.5 pct silicon, having low core losses and used for motors of good efficiency relays and small transformers. Granite City Steel Co., Granite City, Ill.

Granature: Electrical sheets containing 0.5 pct silicon, slightly aging, and used for fractional horsepower motors of low efficiency. Granite City Steel Co., Granite City, Ill.

Granelec: Electrical sheets containing 1.0 pct silicon, slightly aging, and used for motors and generators of medium efficiency; also, small intermittent transformers, relays, etc. Granite City Steel Co., Granite City, Ill.

Granformer: Electrical sheets; transformer grades non-aging, and applicable to the manufacture of high efficiency transformer and rotating machinery. Granite City Steel Co., Granite City, Ill.

Granimo: Electrical sheets containing 3.25 pct silicon, non-aging, and used for motors and generators of high efficiency, intermittent transformers, relays and meters. Granite City Steel Co., Granite City, Ill.

Granisil: Field-grade electrical sheets, having approximately 0.25 pct silicon, used on low-priced intermittent motors. Granite City Steel Co., Granite City, Ill.

Granitiron: Copper-bearing steel sheet used by the culvert industry where maximum resistance to corrosion is desired. Granite City Steel Co., Granite City, Ill.

Granodine: Phosphate coating for steel and iron in a cold spray process to improve adhesion and protective effect of paint coats. American Chemical Paint Co., Ambler, Pa.

Granodine: See Thermoil Granodine.

Graph-All: Alloy steel. Timken Roller Bearing Co., Steel and Tube Div., Canton, Ohio.

Graphalloy: Series of graphites impregnated with Pb base Babbitt, Cu, Ag and Cd for bearings, electrical brushes, contacts for controller. Graphite Metallizing Corp., 1002 Nepperhan Ave., Yonkers, N. Y.

Graphidox: Alloy inoculant for cast iron graphitization control to reduce chill, improve structure, increase strength. Vanadium Corp. of America, 420 Lexington Ave., New York 17.

Graph-Mo: Alloy steel. Timken Roller Bearing Co., Steel and Tube Div., Canton, Ohio.

Graph-Sil: Alloy steel. Timken Roller Bearing Co., Steel and Tube Div., Canton, Ohio.

Graph-Tung: Alloy steel. Timken Roller Bearing Co., Steel and Tube Div., Canton, Ohio.

Grasselli No. 3: Brown powder soluble in solutions of muriatic and sulfuric acids and slightly soluble in water, used as a metal pickling inhibitor in the iron and steel industry. E. I. du Pont de Nemours & Co., Inc., Wilmington 98, Del.

Gray: Arcwelding electrode for steel; corresponds to AWS E-6020. American Agile Corp., 5806 Hough Ave., Cleveland 3.

Graydac: Arcwelding electrode for steel; corresponds to AWS E-6013. Champion Rivet Co., Harvard Ave. & E. 108th St., Cleveland 5.

Gray Devil: Arcwelding electrode for steel; corresponds to AWS E-6012. Champion Rivet Co., Harvard Ave. & E. 108th St., Cleveland 5.

Great Falls: Converters for copper and copper-nickel ores. Allis-Chalmers Mfg. Co., Milwaukee 1.

Green-Stripe: Sandpaper. Clover Mfg. Co., Norwalk, Conn.

Green Tip: See Yellow Tip.

Grefco: See Steelklad.

Greyhound: Series of arcwelding electrodes for steel. Standard Steel & Wire Co., Bolivar, Pa.

Grenz: X-ray tubes. Westinghouse Electric Corp., East Pittsburgh, Pa.

Grey-Rock: Asbestos products, friction material, rubber products. United States Asbestos Div., Manheim, Pa.

Gridnic: Alloy for radio sets and tube parts. Driver-Harris Co., Harrison, N. J.

Griffin's Hytemp: Liquid refractory coating that forms a porcelain-like glaze at temperatures up to 3500°F for furnaces, kilns, etc. George R. Mowat Co., 25 W 40th St., New York.

Gripmaster: Cement for polishing wheels. Michigan Bleach & Chemical Co., 12343 Schaefer Highway, Detroit 27.

Gripsel: Screw for the Rockwell hardness tester for keeping the penetrator in position in plunger rod. Wilson Mechanical Instrument Co., 383 Concord Ave., New York 54.

Grip-Tite: Holder for cleaning brush for removing slag from welds. Atlas Welding Accessories Co., 14824 Wyoming Ave., Detroit 21.

Gulfcrest Oil: Alchlor-processed turbine lubricating oil. Gulf Oil Corp., Gulf Bldg., Pittsburgh.

Gunchrome: Chrome-base refractory for gun application to openhearth electric furnace and boiler walls. Basic Refractories Corp., 834 Hanna Bldg., Cleveland 15.

Gunite: Close-grained high-strength gray iron made by either carefully controlled cupola or air furnace melting methods. Gunite Foundries Corp., 302 Peoples Ave., Rockford, Ill.

Gunk: Cold-process degreasing solvent. Charles Mack & Co., St. Ann St., Manchester 2, England.

Gunmix: Quick-setting basic refractory for maintenance of hot furnace walls, sized for application by air-stream and water through a Gunmix gun. Basic Refractories, Inc., 845 Hanna Bldg., Cleveland 15.

Gusher: Vertical pumps for handling a copious flow of liquid at comparatively low heads, primarily for machine tool coolant service. Ruthman Machinery Co., 1809 Reading Rd., Cincinnati 2.

Gyrex: Vibrating screens. Robins Conveyors, Inc., 270 Passaic Ave., Passaic, N. J.

Gyroset: Foundry core knockouts. Productive Equipment Corp., 2926 W. Lake St., Chicago.

H

H&G: Die heads, threading machines, chaser grinders and feed fingers. Eastern Machine Screw Corp., Truman and Barclay Sts., New Haven 6, Conn.

H.T.S. 33: Al alloy, not heat treatable, for light-alloy castings. Central Pattern & Foundry Co., 3737 S. Sacramento St., Chicago.

H-W: Magnamix, Magnex, Chromex, Metalkase. Harbison-Walker Refractories Co., Pittsburgh 22.

Hackett K-Copper: Cu alloy used for welding tips and holders. Hackett Brass Foundry, 1202 Lillibridge Ave., Detroit.

Hackney: Compressed gas cylinders for anhydrous ammonia, chlorine, acetylene, propane, butane, etc.; also barrels, drums, miscellaneous deep-drawn shapes and shells. Pressed Steel Tank Co., Milwaukee 14, Wis.

Hallamsteel: Alloy and special-carbon steel bars, sheets, plates and wire rods. Hallamshire Steel & File Co., Ltd., Sheffield 3, England.

Hallowell: Work benches, shop stools, work stands, tote pans, etc. Standard Pressed Steel Co., Jenkintown, Pa.

Hallside: Self-lubricating steel for valve stems, valves. Steel Co. of Scotland, Glasgow, Scotland.

Halogen Tin Plating: Acid tin-plating process, using bivalent tin and tin anodes; for continuous tin plating on steel strip or wire. E. I. duPont de Nemours & Co., Inc., Wilmington 98, Del.

Hamburg: Vertical fire tube boilers. Hamburg Boiler Works, Inc., Hamburg, Pa.

Hammertone: Finishes resembling hammered silver, copper, bronze and other ornamental metals are obtained by this liquid finish; applied to metals or plastics. Maas & Waldstein Co., 433 Riverside Ave., Newark 5, N. J.

Hamilton: Steel and wood files for blue prints and tracings and drawing tables for drafting rooms. Hamilton Mfg. Co., Two Rivers, Wis.

Hanchett: Production surface grinders; saw and knife fitting machines and tools. Hanchett Mfg. Co., 906 N. State St., Big Rapids, Mich.

Hancodur: Self-lubricating alloy with excellent wearing qualities and strength of 90,000 psi; for valve stems and bonnets. Hancock Valve Div., Manning, Maxwell & Moore, Inc., 1935 Kossuth St., Bridgeport, Conn.

Handisan: Granulated hand soap. Turco Products, Inc., Los Angeles 54.

Handlift: Hydraulic lift trucks. Lewis-Shepard Products, Inc., 286 Walnut St., Watertown, Mass.

Handy Flux: Improved brazing flux for silver brazing alloys: dissolves refractory oxides rapidly and thoroughly. Handy & Harman, 82 Fulton St., New York 7.

Handy Silver Solder: Series of silver solders with Cu-Zn-Ag for variety of service applications. Handy & Harman, 82-86 Fulton St., New York.

Harbronz: Bronze for bearings. Arthur Harris & Co., 214 N. Aberdeen St., Chicago.

Harcast: Welding rod for cast iron. Harnischfeger Corp., 4400 W. National Ave., Milwaukee.

Harchrome: Arc-welding electrode for 4-6 Cr steel. Harnischfeger Corp., 4400 W. National Ave., Milwaukee.

Harcote: Air-hardened hard-surfacing electrode. Harnischfeger Corp., 4400 W. National Ave., Milwaukee.

Hard Devil: Hard-facing welding electrode. Champion Rivet Co., Harvard & E. 108 St., Cleveland.

Hardenite: Box carburizing compounds. Electric Resistance Furnace Co., Ltd., Weybridge, Surrey, England.

Hard Facing Rod: Abrasion resistant hard-facing welding rod. American Manganese Steel Co., Chicago Heights, Ill.

Hard-Flor Grits: Emery aggregate for cement work. Keystone Emery Mills, 4329 Paul St., Philadelphia 24.

Hard Kote: Heat and corrosion-resistant iron alloys with 16-30 W, up to 30 Ni, up to 23 Cr; for tools, dies, and high temperature parts. Bonney-Floyd Co., 613 Marion Road, Columbus, Ohio.

Hardweld: Arc-welding electrode for building up surfaces to resist shock and wear. Lincoln Electric Co., 12818 Coit Rd., Cleveland 1.

Hardy Nickel Iron: Nickel iron for locomotive stay bolts. Canadian Atlas Steels, Ltd., Welland, Ontario, Canada.

Harmang: Welding rod for Mn steel. Harnischfeger Corp., 4400 W. National Ave., Milwaukee.

Harmomang: Mn-Mo steel, tough and wear resistance, for building-up and resurfacing 11 to 14 pct Mn steel parts such as dipper lips, rock-crusher parts, road grading equipment, railway frogs, etc. Harnischfeger Corp., 4400 W. National Ave., Milwaukee.

Harmony Oil WCR: Lubricating and hydraulic oil, particularly resistant to oxidation and corrosion. Gulf Oil Corp., Gulf Bldg., Pittsburgh.

Harni: Welding rod for 3 pct Ni steel. Harnischfeger Corp., 4400 W. National Ave., Milwaukee.

Harnimoly: Mo steel with strength of 85,000 to 95,000 psi, for arc welding high-carbon or alloy steels that are to be machined or flame hardened. Harnischfeger Corp., 4585 W. National Ave., Milwaukee.

Harstain: Arcwelding electrodes for stainless steel. Harnischfeger Corp., 4400 W. National Ave., Milwaukee 14.

Har-Ten: Welding rod for low carbon steel. Harnischfeger Corp., 4400 W. National Ave., Milwaukee.

Harvill: Ni brass and yellow brass for diecastings. H. L. Harvill & Co., 2223 E. 37th Ver., Los Angeles.

Harz-Lite: Specially processed abrasives for use in bore and cylindrical honing operations. Micromatic Hone Corp., 8100 Schoolcraft Ave., Detroit 4.

Harz Refined Lead: 99.9 lead for chemical industry applications. Bleiwerk Goslar, Goslar a. Harz, Germany.

Hascrome: Iron-base, abrasion-resisting welding rods for hard-facing wearing parts. Haynes Stellite Co., Kokomo, Ind.

Hassall: Cold-headed special nails, rivets, screws, etc. John Hassall, Inc., 162 Clay St., Brooklyn 22.

Hastelloy: Nickel iron alloys with Mo, Si, Cu for pumps, tanks, chemical equipment. Haynes-Stellite Co., Kokomo, Ind.; Union Carbide & Carbon Research Lab., Inc., Niagara Falls, N. Y.

Haveg: Phenolic resin plus asbestos; acid and alkali-resistance, good mechanical strength; for pipes, fittings, valves, tanks, pickling equipment, etc. Haveg Corp., S. Newark, Del.

Hawks Brand White Metal: Cast 53-38 Sn-Pb white metal with antimony and copper, for bearings. Billington & Newton, Ltd., Longport, Staffs, England.

Hayes: Railroad derails, bumping posts and cushion wheel stops. Hayes Track Appliance Co., Richmond, Ind.

Haynes 93: Alloying rod for oxyacetylene hard-surfacing of dredge pump impellers, cement-clinker crusher, rolls, tamper feet for cinder block manufacturing, tube-bending mandrels, farm implements, and other parts where severe abrasion and moderate impact are encountered. Haynes Stellite Co., Harrison & Lindsay Sts., Kokomo, Ind.

Haynes Stellite: Cobalt-chromium-tungsten abrasion-resisting alloys for hard-facing metal parts subjected to heat, abrasive wear, corrosion, erosion, or combinations of these; fabricated machinery wearing parts. Haynes Stellite Co., Kokomo, Ind.

Hazard: Non-metallic covered electrical underground cable. Okonite Co., Passaic, N. J.

Hazel Bronze: Copper alloy for nuts, bolts and studs. Thos. Bolton & Sons, Widnes, England.

H.D.: Cast-iron rolls. United Engineering & Foundry Co., First National Bank Bldg., Pittsburgh 22.

H-E Iron: Specification-controlled gray iron with tensile strengths varying from 30,000 to 60,000 psi and brinell hardness from 180

to 260; for diesel engines, machine tools and general machinery. Hansell-Elcock Co., 485 W. 23rd Place, Chicago 16.

Healthaire: Exhaust fans, shutters and blowers. Johnson Fan & Blower Corp., 1321 W. Lake St., Chicago 7.

Hearth-Crete: Chrome-base castable refractory for building monolithic hearths or bottoms in forging and other steel heating furnaces. Quigley Co., Inc., 527 Fifth Ave., New York 17.

Hearthmix: Castable refractory. Laclede-Christy Clay Products Co., Ambassador Bldg., St. Louis 1.

Hearth Patch: Quick-setting fine-grained basic refractory for deep bottom-hole patching and other emergency hot-furnace repairs in the openhearth. Basic Refractories, Inc., 845 Hanna Bldg., Cleveland 15.

Heat Absorbing Polished Plate Glass: Glass of special chemical composition and pale blueish green color which effects a net reduction of the solar heat entering through the glass. Libbey-Owens-Ford Glass Co., Toledo 3.

Heavy Alloy: 76-90 W, 1-16 Ni, 3-20 Cu powder metals for balancing crankshafts of airplane motors. General Electric Co., Ltd., Wembley, England.

Heavy Pressure: Tin alloy for heavy-duty bearings. National Lead Co., 113 Broadway, New York.

Hecla: 60-38 brass with Pb and Sn for screw machine parts. Titan Metal Mfg. Co., Sieg & Craig Sts., Bellefonte, Pa.

Heetmaster: Hot-dip tanks for metal cleaning operations. Magnuson Products Corp., 50 Court St., Brooklyn 2.

Heil Jet Agitators: Steam jets with spaced nozzles for heating and agitating acid pickling baths; pickling equipment, plating and acid tanks. Heil Engineering Co., 12901 Elmwood Ave., Cleveland 11.

Helco: Series of cast irons containing nickel for hydraulic press cylinders, heavy castings. Hansell-Elcock Co., 485 W. 23 Place, Chicago.

Heliarc: Electrical welding equipment for a process in which the arc is shielded by an atmosphere of monatomic gas, usually argon. Linde Air Products Co., 30 E. 42nd St., New York 17.

Heli-Coil: Inserts, tools and gages used for protecting tapped threads in light metals and plastics as well as stripped threads in ferrous and nonferrous parts. Aircraft Screw Products Co., Inc., 47-23 35th St., Long Island City, N. Y.

Heliocentric: Speed reducers. Universal Gear Corp., 21 & Martindale Ave., Indianapolis.

Heller: Segmental-type, high-speed steel metal cutting circular-saw blades; cold-metal sawing machines. Heller Machine Co., 114 Liberty St., New York 8.

Hellite: Refractory cements. Johns-Manville, 24 E. 40th St., New York 16.

Helspot: Super-quality plastic firebrick designed for use in lining all types and sizes of metallurgical furnaces, ladles (pouring, molding, transfer, shanks, etc.), and spouts of melting units. Mexico Refractories Co., Mexico, Mo.

Helumin: Aluminum alloy with Cu-Fe, for light-alloy parts. Translateur & Co., Berlin, Germany.

Hemo: Heat-treating furnaces. Leeds & Northrup Co., 4956 Stenton Ave., Philadelphia.

Hemocarb: See Hemo.

Heppenstall: Ni-Cr-Mo-V alloy steel for piston rods, crank shafts. Heppenstall Co., 4626 Hatfield St., Pittsburgh.

Hercalloy: Ni-Mo steel for chains, fittings, joining links. Columbus-McKinnon Chain Corp., Tonawanda, N. Y.

Hercose: Cellulose acetate waterproof lacquers that resist discoloration and disintegration in the sun. Hercules Powder Co., Inc., Wilmington, Del.

Hercosol: Solvent in hot-spray lacquers. Hercules Powder Co., Wilmington, Del.

Hercules: High-speed drills, reamers, interchangeable punches. Whitman & Barnes, Detroit 16.

Hercules: Red Strand wire rope. A. Leschen & Sons Rope Co., 5909 Kennerly Ave., St. Louis 12.

Hercules: Wire rope and cables (Red Strand). A. Leschen & Sons Rope Co., 5909 Kennerly Ave., St. Louis 12.

Hercules Model K: Portable universal testing machine for tensile, compression, transverse and shear tests; capacity 0 up to 10,000 lb. W. C. Dillon & Co., Inc., 5410 W. Harrison St., Chicago 44.

Herculoy: Non-magnetic silicon bronze for bolts, nuts, storage tanks, blowers. Revere Copper & Brass Co., 232 Park Ave., New York 17.

Herculundum: Silicon-carbide abrasive. Clover Mfg. Co., Norwalk, Conn.

Herkolite: Phenolic-resin compound. General Electric Co., Schenectady.

Herman: Foundry molding machines. Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22.

Hermeti-Coil: Hermetically sealed electric coil within a plastic case, used primarily in magnetic chucks. Hanchett Mfg. Co., 906 N. State St., Big Rapids, Mich.

Heroult: Electric steel melting furnaces. American Bridge Co., Frick Bldg., Pittsburgh.

H-H Inhalator: Compact, portable, easily operated instrument used in conjunction with artificial respiration to treat cases of respiratory failure. Mine Safe Appliance Co., Braddock, Thomas & Meade Sts., Pittsburgh.

Hevi Koat: Series of arcwelding electrodes for steel. Universal Power Corp., 735 Carnegie Ave., Cleveland 15.

Hewitt Mill: Bearing babbitt. Hewitt Metals Corp., 1918 Stanly St., Detroit.

Hewmet: Bearing babbitt. Hewitt Metals Corp., 1918 Stanly St., Detroit.

Hex-Cel: Wire netting. American Steel & Wire Co., Cleveland 13.

Hexilinder: Cylinder-type grinding wheel for Blanchard surface grinders. American Emery Wheel Works, Providence, R. I.

Hex-Tex: Double V-belt for connecting oppositely rotating shafts. Allis-Chalmers Mfg. Co., Milwaukee 1.

Hex-Top: Grease cups. Link-Belt Co., 220 S. Belmont Ave., Indianapolis 6.

Hextraline: Poultry netting. American Steel & Wire Co., Rockefeller Bldg., Cleveland 13.

Hibbo: Aluminum-copper alloys for light bearings and bushings, gears, pinions, dies, pins. Central Brass & Aluminum Foundry Co., 525 Township Elmwood, Cincinnati.

Hibititе: Acid inhibitor for protecting metal during pickling and cleaning by inhibiting attack of acid and reducing possibility of embrittlement caused by hydrogen penetration. Monsanto Chemical Co., Rubber Service Dept., 4th National Bldg., Akron 8.

Hi-Bond: Helical-ribbed reinforcing bar possessing high bonding strength. Joseph T. Ryerson & Son, Inc., Chicago 80.

Hicore: Case-hardening alloy steel with Cr-Ni-Mo, for gears, pinions. Samuel Fox & Co. Ltd., Sheffield, England.

Hiduminium: Aluminum alloys containing Cu-Ni-Mg-Fe-Ti; for pistons, cylinder heads, automobile forgings. Rolls-Royce Mfg. Co., Derby, England.

Hiduminium: High-strength aluminum alloys, for fabricated structures, consumer goods, forged pistons, etc. High Duty Alloys, Ltd., Slough, England.

Hi-Fatigue: Control cable for aircraft having extra flexibility and high fatigue resistance. Macwhyte Co., 2911 14th Ave., Kenosha, Wis.

High Dynamic: Ni-Cr-Mo steel for piston rods. Timken Steel & Tube Co., Canton, Ohio.

High Graphitic Iron: Iron with Si and Mo for centrifugal castings, steam cylinder liners, packing rings. Janney Cylinder Co., 8037 Frankford Ave., Philadelphia.

High Test: Cast iron with T.C., Ni, Mn, Si for brake drums, valve bodies. International Nickel Co., 67 Wall St., New York.

High-Speed Copper Plating: A cyanide process for depositing smooth, bright, heavy coatings of copper; for steel, diecastings, wire and other parts. E. I. duPont de Nemours & Co., Inc., Wilmington 98, Del.

High-Yield: Low-alloy steels for transportation equipment, buses, trucks and bridges. Granite City Steel Co., Granite City, Ill.

Higlex: Cold-sawing machines. Porter-McLeod Machine Tool Co., Hatfield, Mass.

Hi-Gloss: 18-8 stainless steels for cooking utensils, sterilizing equipment, bumpers. Jessop Steel Co., Washington, Pa.

Hi-Lag: Renewable electrical fuses with low heat-up due to current surges. Ware Brothers, 4452 W. Lake St., Chicago 24.

Hi-Lastic: Wire rope used for drilling, having extra elasticity. Macwhyte Co., 2911 14th Ave., Kenosha, Wis.

Hi-Lift: See Northern.

Hill: Open-side type surface grinders with hydraulically operated tables, made in vertical and horizontal spindle design, 18 to 36 in. wide and 5 to 20 ft long. Also grinding and polishing machines for metal sheets, plates, bars and coiled strip; 6 to 50 in.

wide. Hill Acme Co., 6400 Breakwater Ave., Cleveland 2.

Hill McCanna: 10 Al, 5 Ni, 5 Fe alloy for corrosion-resistant high-strength parts. Hills-McCanna Co., 2355 Nelson St., Chicago 18.

Hilo: Nickel-cobalt-iron for vacuum tube filaments. Wilbur B. Driver Co., Newark, N. J.

Hilo: Paints, varnishes, lacquers, synthetics, japans to decorate and protect ferrous and nonferrous metals against corrosion. Hilo Varnish Corp., 42 Stewart Ave., Brooklyn 6.

Hilo-Chrome: Firebrick. Mexico Refractories Co., Mexico, Mo.

Hiloset: All-purpose high-temperature bonding mortar, with kyanite base, machine mixed for unusual smooth workability, exceptional high fusion point, highly resistant to erosion and slag penetration, in paste form ready to use for laying thin brick to brick joints of great strength. Mexico Refractories Co., Mexico, Mo.

Hi-Nickel Alloy: Alloy steel for general use. Simonds Saw & Steel Co., Lockport, N. Y.

Hioloy: Corrosion-resistant low-alloy steels with Si-Mn-Mo or Si-Mn-Cr-Mo or Mn-Ni-Cr-Mo; for oil refinery equipment. Ohio Steel Foundry Co., Lima, Ohio.

Hiperco: Magnetic metal alloy. Westinghouse Electric Corp., East Pittsburgh, Pa.

Hipernik: Special steel alloy and transformers. Westinghouse Electric Corp., East Pittsburgh, Pa.

Hipersil: Silicon-iron alloy that by a combination of hot and cold rolling processes, followed by a refining anneal, gives superior magnetic properties. Losses are ¼ of those of Hadfields alloy with 10 times the maximum permeability. Westinghouse Electric Co., E. Pittsburgh, Pa.

Hi-Range: Stencils for making isometric and dimetric drawings. Instrumaster Industries, Inc., 73 Arch St., Greenwich, Conn.

Hi-Shear: Two part rivet made up of alloy steel pin and aluminum-alloy collar; very strong and easily removable. Pheoll Mfg. Co., 5700 Roosevelt Rd., Chicago 50.

Hi-Speed: Baking equipment for wire and wire rods prior to drawing. Carl-Mayer Corp., 3030 Euclid Ave., Cleveland.

Hi-Speed: Grinding compounds. Clover Mfg. Co., Norwalk, Conn.

Hi-Steel: Copper-bearing alloy steel for structural applications, mining and transportation. Inland Steel Co., Indiana Harbor, Ind.

Hitch Feed: Automatic punch press feed, attached to either bolster plate or die-set and used with coiled stock; 2 and 4 in. models take material up to 0.031 in. thick. H. E. Dickerman Mfg. Co., 321 Albany St., Springfield, Mass.

Hi-Temp: Furnace for small capacity precision heat treatment. K. H. Huppert Co., Chicago 37.

Hi-Ten: Series of arcwelding electrodes for steel; corresponds to AWS classification E-6010. Page Steel & Wire Div., American Chain & Cable Co., Inc., Monessen, Pa.

Hi-Tensilloy: High-strength alloy cast iron readily flame hardenable. Acme Foundry Co., 2503 22nd St., Detroit 16.

Hitensiloy Bronze: Corrosion-resisting bronze with Ni-Pb-Al for welding rod, pump rods, valve stems, bolts. Titan Metal Mfg. Co., Sieg & Craig Sts., Bellefonte, Pa.

Hi-tenso BB: Copper containing 1 cadmium for electrical wires. American Brass Co., Waterbury, Conn.

Hi-Test Safety Glass: Glass unit composed of two lights of glass laminated with an inner layer of transparent plastic. Libbey-Owens-Ford Glass Co., Toledo 3.

Hocut: Transparent, soluble coolant, treated to resist rancidity, separation and rusting of work. E. F. Houghton & Co., 303 W. Lehigh Ave., Philadelphia 33.

Holfos: Centrifugal-cast bronze gear blanks and bushings. John Holroyd & Co., Ltd., Rochdale, Lancashire, England.

Holeway: See Natco Holeway.

Holfos Bronze: 13 tin, 0.8 phosphorus bronze for high-duty bearings, guides. John Holroyd & Co., Ltd., Rochdale, Lancashire, England.

Holgun: Portable (¼-in.) electric drill. Black & Decker Mfg. Co., Towson 4, Md.

Hollands: Vises and hand tools. Holland Mfg. Co., Erie, Pa.

Hollow Blue Band: Coated welding electrode for stainless steels. Hollup Corp., 4700 W. 19th St., Chicago.

Hollup: Arc welders and "shortstub" electrode holders. National Cylinder Gas Co., 205 W. Wacker Dr., Chicago 6.

Hollup: Plain carbon steel for coated welding electrodes. Vulcan Crucible Steel Co., Aliquippa, Pa.

Hollup: Rod for pressure welds. Hollup Corp., 4700 W. 19th St., Chicago.

Hollup Grade: Series of coated welding electrodes for stainless steels, cast irons, low carbon steels. Hollup Corp., 4700 W. 19th St., Chicago.

Holmquist: Barbed wire and wire fence machinery. Wean Engineering Co., Inc., Warren, Ohio.

Holtite: All types of screws, bolts and special fastenings. Continental Screw Co., New Bedford, Mass.

Homo: Tempering and nitriding furnaces. Leeds & Northrup Co., 4945 Stenton Ave., Philadelphia 44.

Homocarb: Process for carburizing and/or cyaniding; uses electric furnace wherein carburizing fluid is temperature-cracked; and resulting gas is circulated by fan; in cyaniding, ammonia feeds simultaneously with fluid. Leeds & Northrup Co., 4970 Stenton Ave., Philadelphia 44.

Homocord: Belting. Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc., 61 Willett St., Passaic, N. J.

Homo-Flex: Belting, hose. Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc., 61 Willett St., Passaic, N. J.

Honda: A Japanese-developed permanent-magnet alloy. See Mishima and Alnico.

Honhart: Bell-peen hammer for welders. Atlas Welding Accessories Co., 14824 Wyoming Ave., Detroit 21.

Honest Solder: Alloy of 50 Sn and 50 Pb for soldering. Ajax Metal Co., 52 Richmond St., Philadelphia 23.

Hoo-Hoo: Babbitt metal. American Brake Shoe Co., 230 Park Ave., New York 17.

Hook-Flange: Guard rail for railroad trackage. Bethlehem Steel Co., Bethlehem.

Horse Head: Various metal, pigment and chemical products of the New Jersey Zinc Co., 160 Front St., New York 7.

Horse Head Special: Slab zinc of a guaranteed purity of 99.99+ pct. New Jersey Zinc Co., 160 Front St., New York 7.

Hoskins: Heat-resistant 35 Ni, 16 Cr steel for furnace fixtures and heat-resistant applications. Hoskins Mfg. Co., Lawton & Kinnison Aves., Detroit.

Hot-dip: Lead coating alloys and low-tin solders; for corrosion protection, finned tubing, wire drawing lubricant. American Machine & Foundry Co., 511 5th Ave., New York 17.

Hotspur: Medium-carbon Cr-Ni stainless steel for heat and oxidation resistance in furnace parts. Brown Bayley's Ltd., Sheffield. England.

Hott-Patch: Heat setting refractory mortar for laying up and wash coating high-heat duty and super-duty fireclay brick. Ramtite Co., 2563 W. 18th St., Chicago 8.

Houghto-Black: Salt for producing attractive black corrosion-resistant oxide finish on steels. Easily and quickly applied by low temperature aqueous solutions. E. F. Houghton & Co., 303 W. Lehigh Ave., Philadelphia 33.

Houghto-Clean: Series of alkaline cleaners for removal of all kinds of dirt from metals, used in tank cleaners or high-pressure washing machines. E. F. Houghton & Co., 303 W. Lehigh Ave., Philadelphia 33.

Houghto-Draw: Compounds to facilitate forming and stamping of all ferrous and nonferrous metals. E. F. Houghton & Co., 303 W. Lehigh Ave., Philadelphia 33.

Houghto-Kote Strip: Cellulose coating for protection against corrosion. Applied by dipping parts in molten compound, which hardens into straight, easily strippable coating. May be remelted and reused. E. F. Houghton & Co., 303 W. Lehigh Ave., Philadelphia 33.

Houghto-Quench: Fast-cooling quenching oils for imparting maximum hardness and depth to hardened structure of heat-treated steel. E. F. Houghton & Co., 303 W. Lehigh Ave., Philadelphia 33.

Hoyt Metal: Bronze babbitt for bearings for internal combustion engines and pumps. National Lead Co., 113 Broadway, New York.

Hoyt Metal: Lead-tin alloys for bearingr. Hoyt Metal Co. of Great Britain, Ltd., London, England.

H-Scale: Synthetic pearl essence for pearl finishes. Celanese Plastics Corp., 180 Madison Ave., New York 16.

Hubbard Special: A high wear-resistant Ni-Cr-Fe alloy for rolls, guides, castings. Continental Foundry & Machine Co., East Chicago, Ind.

Huglock: One piece, all metal lock nut. National Screw & Mfg. Co., Cleveland 4.

Hurletron: Electronic control and inspection equipment. Electric Eye Equipment Co., Danville, Ill.

Huttohone: Manually expanded and controlled bore honing tools. Available in grip-sleeve or brake types, all of which have adjustable means for limiting expansion. Micromatic Hone Corp., 8100 Schoolcraft Ave., Detroit 4.

HVWM Bright Alloy Plating Process: Alloy electroplate of copper, tin and zinc, from one bath of very high throwing power. Deposit bright and blue-white in color. High corrosion resistance and nonmagnetic, and used particularly for metal parts of electrical equipment. Westinghouse Electric Co., East Pittsburgh; or Hanson-Van Winkle-Munning Co., Matawan, N. J.

Hyalite: High-alumina rotary kiln liners. Quigley Co., Inc., 527 Fifth Ave., New York 17.

Hyam: Controlled atmosphere produced by dissociating ammonia and used for sintering and reducing of powdered metals, bright annealing, and bright brazing. Lindberg Engineering Co., 2450 W. Hubbard St., Chicago.

Hyb-lum: A 2 pct Ni-Cr bearing aluminum for non-corrosive light alloy parts. Barber Asphalt Co., Barber, N. J.; Sheet Aluminum Corp., Liberty & Jones Sts., Jackson, Mich.

Hyb-Lum: Medium-strength aluminum alloy suitable for all types of sheet; work-hardening and heat-treatable grades. Sheet Aluminum Corp., 701 Liberty St., Jackson, Mich.

Hyco: Controlled atmosphere produced by passing air through an incandescent bed of charcoal. The high carbon monoxide, and nitrogen content make it suitable for any tool steel prone to decarburization. Lindberg Engineering Co., 2450 W. Hubbard St., Chicago.

Hydrams: Metal drilling and honing machines. Barnes Drill Co., 814 Chestnut St., Rockford, Ill.

Hydratrol: Lathes of various sizes. Lehmann Machine Co., Chouteau at Grand, St. Louis 3.

Hydraulic Honing: Metal honing machines. Barnes Drill Co., 814 Chestnut St., Rockford, Ill.

Hydraulic Universal: For precision tool room grinding operations. Cincinnati Grinders, Inc., Marburg Ave., Cincinnati.

Hydreco: Hydraulic control devices; pumps, valves and hoists. Hydraulic Equipment Co., 1100 E. 222 St., Cleveland 17.

Hydrex: Vibrating screens. Robins Conveyors, Inc., 270 Passaic Ave., Passaic, N. J.

Hydril Bearing Metal: 70-30 Cu-Pb for bearings. Hydril Co., Lomita, Calif.

Hydrite: Water-suspension lubricant. National Graphite Co., Inc., 6 Maiden Lane, New York 7.

Hydro-Arc: Electric-arc melting furnaces with hydraulic top charging mechanism. Whiting Corp., 15628 Lathrop Ave., Harvey, Ill.

Hydro-Broach: Vertical ram broaching machine for high production surface broaching. Cincinnati Milling Machine Co., Marburg Ave., Cincinnati.

Hydrocast: Cold-chamber diecasting machines Hydropress, Inc., 570 Lexington Ave., N. Y.

Hydrocon: Producer and controller of hydraulic pressure and flow. Brownstein Manufacturing Co., Ellwood City, Pa.

Hydro-Flow: Monorail, belt and gravity-type industrial washing machines. International Conveyor & Washer Corp., 650 E. Fort St., Detroit 26.

Hydro-Foam: Dust collector and air purifying units. R. C. Mahon Co., Detroit 11.

Hydrofuse: Device for hydraulic systems comparable to a circuit breaker for electrical systems. Aeroquip Corp., 300 South East Ave., Jackson, Mich.

Hydrohone: Bore honing tools and machines which use hydraulic means for actuating the expansion of the tool during operation. Micromatic Hone Corp., 8100 Schoolcraft Ave., Detroit 4.

Hydr OILic: Power units for presses. Denison Engineering Co., 1160 Dublin Rd., Columbus.

Hydromatic: Automatic-bed type milling machine for medium to high production work. Cincinnati Milling Machine Co., Marburg Ave., Cincinnati.

Hydronalium: Sea water corrosion-resistant aluminum alloy with 7 Mg, 0.5 Mn for seaplane parts. I. G. Farbenindustrie A.G., Frankfurt a.M., Germany.

Hydrone: 31 Na, Pb alloy used as deoxidizer for non-ferrous metals. E. I. du Pont de Nemours & Co., Wilmington, Del.

Hydroptic: Precision jig borers made by Fritz Stauder, Ltd., Glockenthal Thun, Switzerland; Motch & Merryweather Machinery Co., Cleveland.

Hydrosize: Bore honing machines and tools controlled by air or liquid-sizing devices. Micromatic Hone Corp., 8100 Schoolcraft Ave., Detroit 4.

Hydro-Tel: Bed type milling machines, several sizes, both horizontal and vertical, completely hydraulic in operation. Cincinnati Milling Machine Co., Marburg Ave., Cincinnati.

Hydro-Whirl: Spray booths, dust collectors, washers, dryers, ovens. Peters-Dalton, Inc., 17900 Ryan Rd., Detroit 12.

Hydrovac: Dust-handling systems. Allen-Sherman-Hoff Co., 1427 Locust St., Philadelphia 2.

Hyen: Controlled atmosphere produced by the endothermic gas-cracking process for bright hardening of high-carbon steels totally free from scale, carburization or decarburization. Lindberg Engineering Co., 2450 W. Hubbard St., Chicago.

Hyex: Controlled atmosphere produced by the exothermic gas cracking process for bright annealing, normalizing and tempering where decarburizing is not a factor. Lindberg Engineering Co., 2450 W. Hubbard St., Chicago.

Hy-glo: Cutlery type stainless steel for tools, machine parts and cutlery. Latrobe Electric Steel Co., Latrobe, Pa.

Hygrade: Speed reducers. Foote Bros. Gear and Machine Corp., 4547 S. Western Blvd., Chicago 9.

Hylastic: Steel with 1.75 Mn, 0.1 V for railroad and structural castings. American Steel Castings Co., Avenue L & Herbert Ave., Newark, N. J.

Hylastic: High-tensile 1.6 Mn, V alloy steel with great strength resistance to shock, for railroad and highly stressed structurel service; reduction in weight and machinability without special tooling; readily welded into assemblies. American Steel Foundries, 400 N. Michigan Ave., Chicago 11.

Hy-Lift: Tiering platform trucks. Baker-Raulang Co., 2168 W. 25th St., Cleveland 13.

Hy-Mac: Hydraulic power units for drilling, grinding, milling, riveting, pressing and special applications. Hydraulic Machinery, Inc., 12827 Ford Rd., Dearborn.

Hymax: Series of magnet steels with 3 to 35 Co and Cr-Mo and also W for cast magnets. Edgar Allen Steel Co., Inc., 743 Washington St., New York.

Hyperbo: Industrial gas burner of the sealed-in type. National Gas Burner Div. of Mid-Continental Metal Products Co., 1960 N. Clybourn Ave., Chicago 14.

Hyperm: Magnetic high induction silicon-iron alloy or Ni-Fe alloys for high permeability in magnets, electrical apparatus. Fried. Krupp, A.G., Essen, Germany.

Hypocrode: Austenitic cast iron with 13 Ni, 5 Cr, 7 Cu for hydraulic parts, pump bodies, impellers, furnace parts. Sheepbridge Stokes Centrifugal Castings Co., Ltd., Chesterfield, England.

Hyper-Reset: Instruments for control of temperature, pressure, flow and other variables in continuous process. Foxboro Co., Foxboro, Mass.

Hypersonic Analyzer: Supersonic machine for inspection of solid objects. Sperry Products, Inc., Willow Ave., Hoboken, N. J.

Hyper-Vac: Rotary type vacuum pump. Central Scientific Co., 1704 Irving Park Road, Chicago 13.

Hypro: Double housing and openside planers, vertical boring mills and planer type milling machines. Cincinnati Planer Co., 3120 Forrer St., Cincinnati 9.

Hyprolap: Lapping Machines. Norton Co., Worcester 6.

Hy-Speed: Acid-resistant Pb-bearing Bronze for general use. Buckeye Brass & Mfg. Co., 6410 Hawthorne St., Cleveland.

Hysterset: An electronic method of control, including a specially constructed magnetic circuit providing a high degree of power amplification. Ward Leonard, 31 South St., Mt. Vernon, N. Y.

Hyten: C-Cr-Mn iron alloy for shafts, gears, arbors, connecting rods. Wheelock, Lovejoy & Co., 128 Sidney St., Cambridge, Mass.

Hy-Ten: Core oils and dry binders for ferrous and nonferrous casting. E. F. Houghton & Co., 303 W. Lehigh Ave., Philadelphia 33.

Hy-Ten-Sl: 65-35 Cu-Sn bronze for worm wheels, gears, bearings. American Manganese Bronze Co., Rhawn & Torresdale Ave., Philadelphia.

Hy-Ten-Sl Bronze: 64 Cu-22 Zn with Al, Mn and Fe; for wear and corrosion resistance in impellors, gears, valves. American Man-

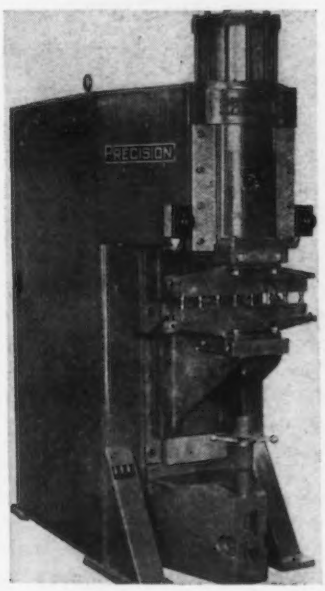
(CONTINUED ON PAGE 131)

New Equipment . . .

Welding

Improved models of press type and rocker arm spot welders, flash and ac welding units, diesel and gas driven arc welders, cutting torches, soldering irons, a powder metallizing gun and sequence-weld timers are featured in this week's review. Various electrodes and brazing fluxes are also discussed.

❶ Air vertical action spot and projection welders have been announced by the *Precision Welder & Machine Co.*, 138 E. McMicken, Cincinnati 10. These press type welders are made in four standard sizes covering the range from 30 to 500 kva and pressure to a maximum of 18,000 lb. The machines are constructed with unit assemblies, simplified installation and complete accessibility of the interior. They feature honed brass air cylinders with cushion and universal connection to ram, and an overhang arm fabricated integral with the steel frame. The ram is extra long with V ways fully contained in gibs, which are adjustable for wear. Dual palm buttons or alternate foot switch are provided for initiating sequence of operation.

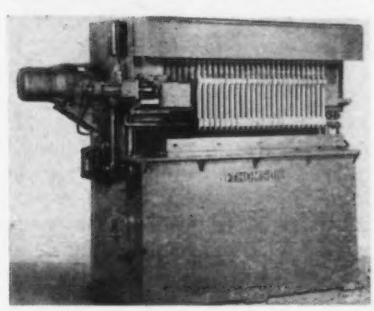


Spot Welders

❷ Small press type spot welders have been announced by the *Taylor-Hall Welding Corp.*, Div. of *Federal Machine & Welder Co.*, Warren, Ohio, which apply welding pressure in a straight vertical movement of the upper electrode, representing a departure, it is said, from the radial pressure approach of the rocker arm type. The vertical ram on which the upper horn is mounted rides on V-shaped slides, 20 in. long. The lower horn has a vertical adjustment of 6 in. and swing adjustment through 90°. The upper horn may be adjusted 1 in. out beyond the end of the lower horn. The welder measures only 9 x 20 in. on the base, permitting variety of angular work and less need for extra long horns. The machine presents a new transformer design said to require less input for maximum welding power. Ratings available are in 5 and 10 kva capacities.

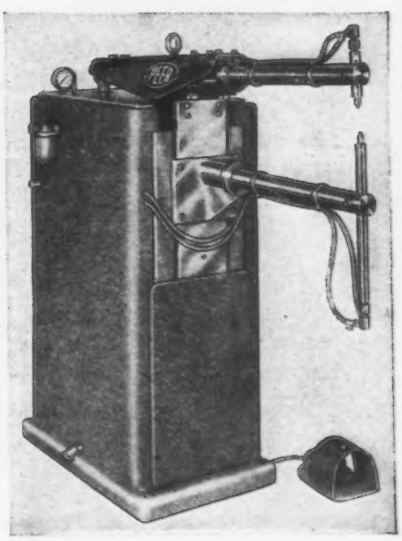
High-Speed Spot Welder

❸ Designed primarily for welding wire mesh such as is used for grilles, racks, trays, etc, a high-speed spot welder having possibilities for mass production jobs involving large numbers of similar welds closely spaced on a uniform surface, has been developed by the *Thomson Electric Welder Co.*, Lynn, Mass. The model shown has 25 electrodes arranged to weld up to 25 longitudinal wires spaced as desired across a maximum width of 48 in. The normal capacity ranges from 14 to 14 gage min to 0 to 0 gage max. Longitudinal wires can be fed into and through the machine continuously if desired. Spot spacing between welds can be varied from a minimum of 1½ in. up. Wide spacing which requires fewer electrodes for the maximum work width accommodated by the machine is accomplished without removing electrodes by means of individual cut-out valves. To handle welds in which succeeding lines are made in a pattern such as diamond mesh or diagonal weave, a shuttle bar operated by hydraulic cylinder moves the entire bank of electrodes right or left of the initial position. Two 50 kva transformers with individual heat regulators and Weld-O-Trol controls provide welding current.



Air-Operated Spot Welders

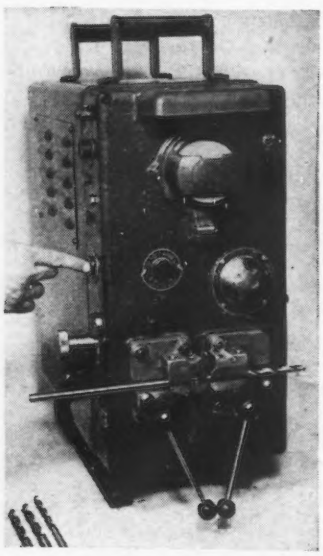
❹ Series A-200 automatic air-operated, rocker arm, spot welders has been announced by the *Pier Equipment Mfg. Co.*, Benton Harbor, Mich. The welders incorporate a double acting air cylinder of ample size to provide high electrode pressure. The rocker arm is mounted on roller bearings and hammering of the electrodes is minimized by the lightweight welded steel construction of the rocker arm assembly. Minimum obstruction on the front of the welder facilitates the handling of large or irregular shaped parts, and the electrical design is said to provide a lower power demand for



a given welding job. Welder capacities are 10 and 15 kva with throat depths of 8, 12, 18, 24 and 30 in.

Flash Butt Welder

❺ Designed for production welding of bar and round stock up to 5/16 in. diam, an automatic flash butt welder has been developed by the *DoAll Co.*, 1301 Washington Ave. S., Minneapolis 4, which is said to provide a quick economical method of joining most metals in repairing small tools, butt welding



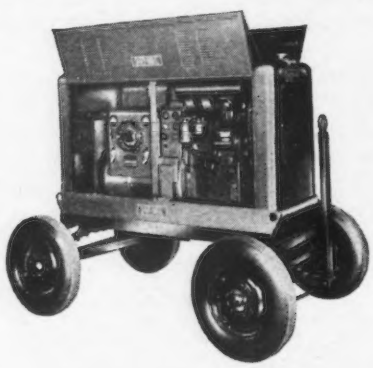
tool bit extensions and shanks and joining band saw blades from 1/16 to 1¼ in. in width. The welder features a built-in grinder for weld dressing, automatic motor controlled feed of material, and cam operated lever method of clamping which speeds up the welding operation. Welding is fully automatic, the complete cycle being controlled by a single pushbutton switch. In addition to welding, annealing and flash dressing, an etching attachment provides a means of identifying tools, templates, attachments, jigs, etc. The machine is designed for standard ac 220 v single phase 50 to 60 cycle operation.

Flash Welders

❻ A line of flash-welding equipment has been announced by *Sciaky Bros.*, 4915 W. 67th St., Chicago, which includes miter joint welders for production of steel and aluminum window frames, door sashes, etc., for the building trades. Welders range in size from 75 kva for 0.90 sq in. mild steel up to large, completely automatic machines rated 500 kva for capacities up to 5 sq in. Flashing and upsetting on smaller welders are by means of a hand lever. Large welders may be either all power-operated, or a combination of hand lever flashing and power upsetting. Frames are designed as a selfcontained beam with conductors from transformer to dies outside the frame, eliminating need for a cutout within the frame and allowing transformer to be protected from flash sparks. Platens move on a wide, rigid T-shaped bed with a narrow guiding key. Clamps are actuated by a high-pressure, booster-supplied hydraulic system. On the power-operated machines, flashing and upsetting are independently controlled. Heavy-duty machines can be equipped with synchronous timing control, post-heat current and phase shift heat control to permit welding of aluminum alloys, high carbon and aircraft steels.

Diesel Driven Arc Welder

❼ A diesel engine driven arc-welder of 300 amp capacity, made for use in locating where electric power is not available and a minimum operating cost is desired has been announced by *Hobart Brothers Co.*, Troy, Ohio. Powered by a two-cylinder, unit-injection diesel engine, that features oil cooling, displacement blower, fuel filtration and easy starting, this 300 amp welder is said to cut fuel cost considerably. This engine has a 4½-in. bore and a 5-in. stroke, and is rated 47 hp at 1450 rpm. Equipped with Multi-Range dual



control and remote control, this welder permits the operator to make fine volt-amp adjustments right at the work. Its 1000 combinations of voltage and amperage provide a selection of the right arc intensity to suit any job. The welding generator has a rating of 300 amp, 40 v. Current range for welding duty is from 20 to 40 v, 60 to 375 amp.

AC Welder

❽ Announcement of the Fleet-Arc ac welder has been made by the *Lincoln Electric Co.*, Cleveland 1. Equipped with an arc booster, the new welder is said to surpass the conventional ac welder in ease of welding, depth of penetration and range of output. The arc booster augments the current the instant

the arc is struck; the arc is started automatically the moment the electrode touches the work. A selector switch on the front of the welder governs the amount of booster current to be used in striking the arc, providing a range of striking intensity to suit requirements in the welding of thin sheets or heavy plates, making of tack welds, or in the use of various types and sizes of electrodes. Current control, continuous and selfadjusting, is provided by the rotating reactor control, which affords fast setting throughout the range of the welder. Thermostatic control which opens the magnetic starter when overloaded provides selfprotection for the operator. The Fleet-Arc welder is manufactured in 200, 300 and 500 amp range, both frame and housing of all-welded construction.

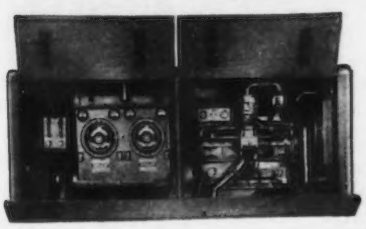
Arc Welder

❾ Equipped with a compact combination drive consisting of a standard 300 amp generator and 20 hp induction motor mounted on a heavy solid shaft coupled to a Chrysler six-cylinder industrial engine through an over-running clutch coupling, an arc welder has been announced by the *Hobart*

Bros. Co., Troy, Ohio. The coupling allows the gasoline engine to drive the welding generator positively. However, should the gasoline engine be stopped and the generator be driven by the electric induction motor, the clutch will automatically overrun, or free wheel. The induction motor is wound for dual voltage 220/440. The gasoline engine is furnished with an idling device and all other features that are carried by the standard Hobart 300 amp gas drive. The welder is suitable for job welding shops, for locations where power may fail, and when on a portable mounting for industries which have equipment spread over large areas.

Gas Drive Welder

⑩ By placing two 300-amp generators on a common shaft, a two operator gasoline engine driven arc welder has been developed by the *Hobart Brothers Co.*, Troy, N. Y. The welder is supplied with separate excitation from a common exciter. This double unit is directly connected to an eight-cylinder Chrysler industrial engine. Two



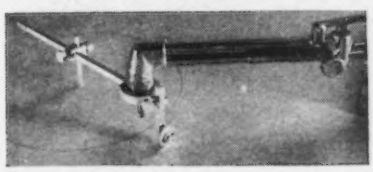
operators can work independently of each other, since the engine is governed to maintain constant speed for all loads. A paralleling switch is provided to turn the unit into a single operator 600-amp unit, doubling the welding range of the conventional single operator unit.

Selfpropelled Welder

⑪ Mobile type selfpropelled arc welders have been announced by the *Hobart Brothers Co.*, Troy, Ohio, for maintenance welding operations around large oil refineries, steel mills, quarries, and other industrial plants where it is desirable to take the welding machine directly to the job. Welding equipment consists of a 300-amp welding generator and tank carriers for oxyacetylene welding. The door to the tool chest in the rear becomes a welding and work bench when opened. A Chrysler industrial 6-cylinder engine furnishes power for welding and transportation. The unit has an automotive type transmission, three speeds forward and one reverse, and is connected directly to the welding generator. All controls are automotive type.

Flame Cutting Torch

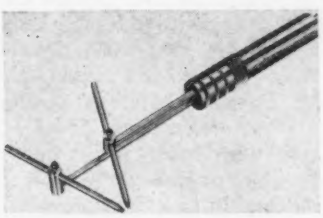
⑫ Known as the Flash Circle Burner, an attachment for a flame cutting torch for cutting accurate circles, curves or straight line in plate, has been announced



by the *Scientific Research Co.*, 1618 N. Vancouver Ave., Portland, Ore. Streamlined for quick height and radius adjustment, it is said to be proficient in either vertical or horizontal position. A ball bearing rotary head insures easy, free-running operation, either clockwise or counter-clockwise. The head is shielded for protection from slag or heat. A square radius bar prevents twisting or clocking, and the burning torch is parallel to the centering pin to insure an even, perpendicular cut. The tracking wheel, heat treated to prevent gumming or sticking when exposed to flame, may be set at a distance behind the head to allow circle-burning to the edge of the plate.

Arc Torch

⑬ Called the Lite-ning Arc Torch, a welding torch for use with ac and dc welders has been announced by *Cesco Products, Inc.*, 30 N. LaSalle St., Chicago 2. The torch has been designed to widen the scope of electric welders permitting them to be used also for



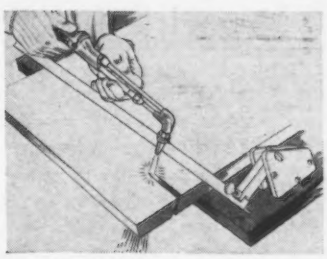
jobs that formerly required gas welders. A soft intense heat with no pressure blow or oxides is characteristic of the carbon arc flame roduced by the arc torch. It is said to make possible the welding of aluminum and ferrous and nonferrous metals, as well as brazing, soldering, preheating and hard surfacing. It is said even thin aluminum sheets can be welded without backing. Thumb control permits the operator to maintain instant adjustment of the arc at all times.

Welding Generator

⑭ By special designing the standard Jeep auto has been arranged with power take-off from the inside so that a 200 amp welding generator is driven, *Welding Engineering Co.*, 264 E. Ogden Ave., Milwaukee 2, has announced. The welding generator is mounted in the Jeep and driven by V belts from the power take-off, with governor speed control. It is said this unit is flexible and can be used advantageously by job welders, erectors, and industries in general.

Straightedge Guide

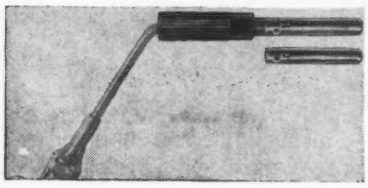
⑮ For flame cutting steel plates and shapes with a hand torch, a magnetic straightedge guide, called the Cut-O-Guide, has been offered by the *Universal Power Corp.*, 769 Carnegie Ave., Cleveland 15. The assembly is made of heat



treated aluminum alloy that will not warp from heat, is lightweight and corrosion resistant. Aluminum holders are provided with Alnico magnets which exert a 30-lb pull and are said to hold the straightedge rigidly in place whether the plate is rusty, oily, or painted; flat or curved; in any position, horizontal, vertical or overhead. The detachable holders can be secured at any point along the straightedge permitting the guide to extend beyond the plate to be cut. A collar, having a 5/8-in. ID, is attached to the cutting tip and rides along the edge of the angle, permitting the operator to maintain a uniform distance between the end of the cutting tip and the work surface along the entire length of the cut. Holders are made with a swinging arm that permits the straightedge to be changed from a right angle cutting position to a 30° scarfing bevel. Straightedges are 3-ft long.

Torch Accessory

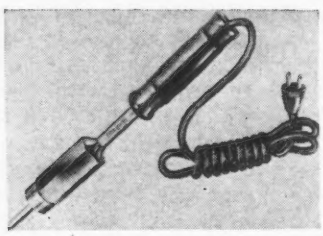
16 An accessory said to afford double-duty for oxyacetylene welding torches has been announced by *Cesco Products, Inc.*, 30 N.



LaSalle St., Chicago 2. Known as the Puddler, this unit fits over the end of any standard welding torch tip. It is used with acetylene alone, providing an ideal flame, it is said, for body soldering, tinning, silver soldering and heating jobs. Two tips are furnished with the kit; one for light duty soldering and one for body soldering.

Soldering Iron

17 Added to a line of industrial electric soldering irons manufactured by the *Hexacon Electric Co.*, 144 West Clay Ave., Roselle Park, N. J., is an iron wound for 300 w, having a ⅜-in. instead of the conventional ⅞-in. diam tip, the new construction of which is said to provide extremely high heat for a small tip cross-section and permit faster soldering on heavy work. The heating element is housed in a damage-proof hexagon-shaped barrel which can be held in a vise when replacing the tip without danger of denting the hous-



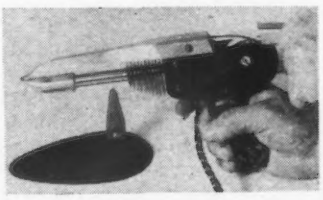
ing or damaging the element. The iron is equipped with 6 ft, 10,000 cycle, approved heater cord and rubber plug. Tips in all irons are replaceable and are made of hard drawn pure copper.

Short Cutting Torch

18 To facilitate repair of fire tube boilers, *Air Reduction Sales Co.*, 60 E. 42nd St., New York 17, has made available a short cutting torch, with an overall length of 13 in. This lever type oxyacetylene cutting torch can be furnished with either a 45°, 75°, or 90° bronze head, and is particularly adaptable to the removal of worn tubes from the type of heating boilers found in buildings, large homes and factories where low pressure process steam is required. Its short length permits boiler repairmen to work in confined work spaces often as little as 12 in. deep. When retubing, and if carefully done, an entire wall can be cut, it is said, without injury to the tube sheet and without cutting through the outside of the tube and depositing slags. Contraction after cooling permits drawing the tube out through the front end of the boiler.

Self-Feeding Soldering Iron

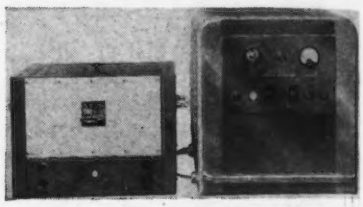
19 Trade-named Eject-O-Matic, an automatic, self-feeding soldering iron has been designed for production soldering, by the *Multi-Products Tool Co.*, Newark, N. J.



A spool of core solder fits into the pistol-grip type plastic handle and is automatically fed to the tip by pulling a trigger. The amount of solder fed with each pull of the trigger is regulated by a micrometer adjusting wheel built into the handle. For continuous production work, the core solder may be fed through the back cover of the iron from reels mounted on or under a work bench. The soldering iron, by freeing one hand for the operator, is said to reduce fatigue and thus speed up production.

Induction Heater

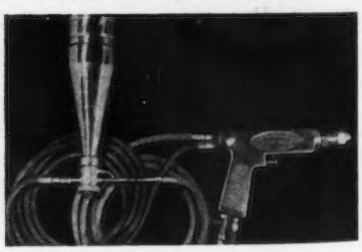
20 Brazing and soldering in small and medium sized operations is said to be facilitated by a 1-kw electronic power generator, developed by the Engineering Products Dept., *Radio Corp. of America*, Camden, N. J. The generator, Model 1-AL, is a vacuum tube unit which converts the ordinary 60-cycle line power supply to a frequency of approximately 400,000 cycles per sec. It consists of two units: the generator proper and an applicator unit. Only the applicator need be at the work position and may be located within a 25-ft radius of the generator. Connecting and remote control cables are provided with the unit. An automatic timing device is provided for presetting the interval of operation. There is no physical contact between the part to be soldered or brazed and the applicator work coil; the metal workpiece merely passes through the magnetic field of the coil, where high-frequency currents are in-



duced in the metal to produce the required temperature. The work coil is shaped to conform to the heating pattern. By the adjustment of power and timing, the depth of heating can also be controlled.

Powder Metalizing Gun

21 Known as the Spraywelder, a powder metalizing unit has been announced by *Wall Colmonoy Corp.*, 19345 John R, Detroit 3, for use in the company's Sprayweld process. With this unit it is possible, it is said, to combine both welding and metalizing procedure. The unit is operated in the first part of the process as a powder metalizing unit to apply a uniform overlay of the Colmonoy alloy, then used as a welding torch to fuse this sprayed overlay to the base metal, obtaining a fusion or molecular bond, identical, it is claimed, to that obtained when the same alloy in rod



form is applied by acetylene welding. There are only two control valves, both of which are mounted on the gun itself. Once adjusted, the powder flow may be stopped and started by pressing or releasing the trigger. The gun, which is lightweight, may be hand operated, or held in a vise or with an attachment in the tool post of a lathe.

Pneumatic Scaling Hammer

22 Announcement of an air-powered peening and scaling hammer, Model 7002, for removing scale and rust on welded parts, has

been made by the *Aro Equipment Corp.*, Bryan, Ohio. The tool delivers 5000 blows per min, yet will not distort light sheet metal when removing scale, it is reported. Piston and cylinder are of alloy steel, precision ground. Overall length of the hammer head is 2½ in. and the tool is 7 in. in length, small enough to get into hard-to-reach places. Body of the tool is cast aluminum with automatic throttle valve. Connection between the hammer head and the body can be any desired length.

Surfacing Electrode

(23) Announcement of C-30 electrode developed for the building up of worn surfaces on shafting, pins and bushings has been made by the *Champion Rivet Co.*, Harvard Ave. & E. 108th St., Cleveland 5. It is reported that this electrode deposits metal of good wearing qualities which is readily machined. It is useful for many applications in steel mills, railroads and shipyards as it eliminates the necessity of dismantling the entire assembly to replace worn parts. C-30 electrode is said to be easy to handle and makes sound welds.

Sequence Timers

(24) Redesign of a line of sequence and sequence-weld timers for resistance welding has been announced by the Control Div., *General Electric Co.*, Schenectady 5. The design is said to permit quick change of the welding sequence, easy inspection and maintenance, and remote operation. An improved electronic timing circuit makes possible the consistent welding speed essential to high-production welding with short timing intervals. The sequence timer designed for applications requiring the highest degree of weld consistency coordinates the mechanical operation of an air or fluid-operated spot or projection welder with the

flow of welding current, as determined by a synchronous-precision weld timer. For less exacting applications, the sequence-weld timer provides the necessary control of both mechanical sequence of operation and nonsynchronous control of weld time. Both can be used with all standard control combinations in which ignitron contactors or synchronous-precision timers are used. Timing control sections of different types can be interchanged without rewiring, and the timing control station can be mounted on the welding machine or elsewhere. The initiating circuit, normally 115 v, can be easily changed to 24 v, and a two-stage foot-switch can be added at any time. All 60-cycle panels are suitable for operation on 208, 230, 460 or 575 v, 50 or 60 cycles.

Hard-Facing Electrode

(25) Coated Self-Hardening, a wear resistant electrode for hard-facing heavy equipment subjected to earth abrasion and impact has been manufactured by the *Stoody Co.*, 1145 W. Slauson St., Whittier, Calif. Coated Self-Hardening is a fabricated rod consisting of mild steel tubes filled with alloying elements. The coating is applied to the rod by means of a hydraulic extrusion press which is claimed to increase the strength over dipped coatings and reduce tendency to pick up moisture. Other advantages include excellent arc characteristics with either ac or dc machines, rapid deposition rate, and solid, dense deposits with a minimum of porosity. Hardness ratings average 56 Rc. Electrodes are available in ¼, 3/16, 5/32 and ⅛-in. sizes.

Low-Hydrogen Electrodes

(26) Known as Shield-Arc LH-70, an electrode which is said to simplify the welding of high sulfur, free-machining steel and of certain high tensile, low-alloy steels has been announced by the *Lincoln Electric Co.*, Cleveland 1. It has a low-hydrogen, low-moisture coating and is designed for use with dc polarity, as the welded tensile properties are 70,000 to 80,000 tensile strength and elongation is 25 to 30 pct. The range is ⅛ in., 100 to 135 amp; 5/32 in., 140 to 190 amp and 3/16 in., 180 to 250 amp. One use of these electrodes is in the arc welding of materials which have to be enameled. Where it was formerly necessary to heat treat the vessels after welding to drive out the hydrogen, enameling may now be done without heat treating.

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High-Carbon Electrodes

27 High-carbon electrodes for building up worn steel parts by welding with low-voltage ac transformers, as well as dc, have been announced by the *Lincoln Electric Co.*, Cleveland 1. These electrodes, designated Hardwell 50 ac and 100 ac, are reported to produce a dense, tough surface of moderate hardness to resist shock and abrasion. They have a heavily extruded shielded-arc-type coating, produce flat, smooth beads and the deposits can be hot-forged. Hardweld 100 ac has a hardness of deposit on straight carbon steel when allowed to cool naturally, of 20 to 45 Rc; Hardweld 50 ac, a hardness of 20 to 35 Rc. Sizes of the 100 ac are ⅛ in., range, 70 to 110 amp; 5/32 in., 105 to 170 amp; 3/16 in., 145 to 230 amp and ¼ in., 215 to 350 amp. Primary color is brown, secondary, blue, under the NEMA color code. Hardweld 50 ac is available in two sizes, 3/16 in. and ¼ in. with brown primary color.

Arc Welding Electrode

28 Called Raco composite type A, an automatic arc welding electrode has been introduced by the *Reid-Avery Co.*, Baltimore Md. The electrode is designed to increase the efficiency of automatic arc welding. Among its features are the elimination of slitting shielded arc coatings to obtain contact with wire, and the doing away with the wrapping of shielding materials on the wire during operation. This electrode likewise does away with the recovering of unused melt.

Turning Rolls

29 Model 60 turning roll, comprising a power and idler unit for the rotation of tanks and other cylindrical shapes for either manual or automatic welding has been announced by the *Reed Engineering Co.*, 201 East Broadway, Webb City, Md. The power unit is built with

a variable speed drive which is said to give perfect welding speeds for any type of welding on any kind or thickness of material. Both power and idler units are adjusted for any required diameter. Constant, even rate of rotation can be selected by the turn of a dial, producing better welds at faster welding speeds. **The capacity** of the standard unit is 6000 lb. Extra idler units of 3000 lb provide additional capacity where required. Units are of all-steel construction, equipped with rubber tired wheels as standard equipment, together with reversing switch and 20 ft of cord and motor for 220/440 v, 60 cycle, 3 phase.

Aluminum Brazing Flux

30 Elite aluminum brazing flux, having a low melting point and developed for aluminum brazing has been announced by the *Air Reduction Sales Co.*, 60 East 42nd St., New York 17. Due to Elite's physical properties, brazing wire, Airco No. 26, has been made available for brazing 2S, 3S, 53S and 61S aluminum.

Hard-Surfacing Electrode

31 Called Resistwear, a hard-surfacing rod developed by the *American Manganese Steel Div., American Brake Shoe Co.*, Chicago Heights, Ill., is a high carbon, chrome, molybdenum, shielded arc electrode that can be deposited on any ferrous base metal. It will produce, as deposited, it is said, hardness of approximately 400 and 500 Bhn, depending upon the degree of dilution from the base metal. It can be used for a wide range of applications where it is desirable to protect ferrous parts, subjected to abrasion with or without impact, with an overlay of a more wear resistant material. Resistwear is available in coated form only for ac and dc application in ⅛, 5/32, 3/16, and ¼ in. diam x 14 in. long.

Automatic Electrodes

32 Addition of Una automatic wires and Una tapes to its line of manual electrodes has been announced by the *Wilson Welder & Metals Co., Inc.*, 60 East 42nd St., New York 17. Five knurled type wires and five flux impregnated tapes comprise the present line which has been designed for flat position operation. Assembly line applications range from thin gage sheet metal forms to axle housings, boilers and torque tubes, etc. The electrodes are available in several diameters and alloy analyses. The automatic wires may be used separately or in conjunction with the tapes.

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INDUSTRY BANS RUST AND CORROSION

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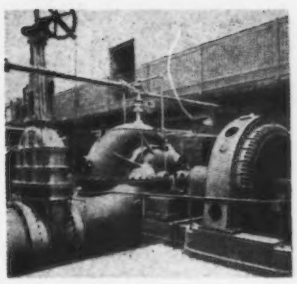
Few industries can escape the destructive effects of rust and corrosion but *all* industries can reduce their costly ravages in maintenance and breakdown.

Here are six industrial applications where Harper's EVERLASTING FASTENINGS have licked rust and corrosion.

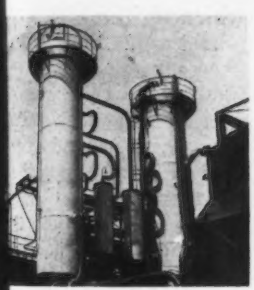
MONEL STOPS CORROSIVE CHEMICALS

Problems in salt production have been solved by using Monel bolts. In mining, treating and handling of many chemicals, non-ferrous alloys are the answer to efficient operation.



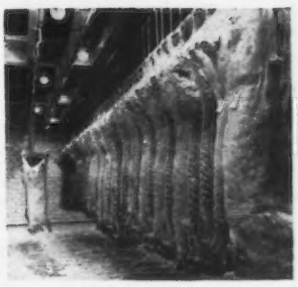
BRASS GUARDS WATER SYSTEMS

In valves and pumps that compose the heart of water works, Brass fastenings help in eliminating the most common cause of replacement—rust.



STAINLESS STEEL SOLVES OIL PROBLEMS

Acids and gases at high temperatures attack metal but Stainless Steel alloys cut refinery replacements to a minimum, assure years of continued operation.



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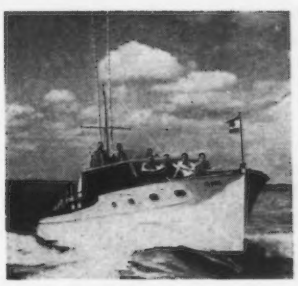

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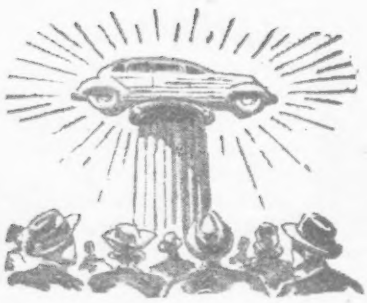
Assembly Line . . .

WALTER G. PATTON

• Ford slashes prices $15 to $50 in an effort to halt cycle of mounting costs and rising prices . . . Chevrolet and Ford run a dead heat in 1946.



DETROIT—One prominent Detroit citizen put it this way: "Just a few weeks ago the Ford Motor Co. announced a $32 million deficit; this week Ford announces a price reduction of $15 to $50 per car to clear up the deficit. To many people this will sound like cockeyed economics but it will have an amazingly good chance of working out for Ford."

While Ford's price cut undoubtedly caught many in the industry off-guard it was not entirely unexpected. Most observers here have been convinced for some time that Ford would take the lead in breaking the upward spiral in car prices. What was decidedly unexpected was the timing of the Ford announcement. Coupled with it is the fact that Ford is the only producer in the industry who has not raised prices since decontrol became effective.

Coming at a time when prices for labor, material and supplies are shooting upward with every passing day and with GM producing its 1947 cars but not having made a 1947 price announcement, it would be difficult for Ford to find a more propitious time to make a bid for lower prices. Pointing out that the mass production business is profitable only when prices are low, Henry Ford II said:

"The un-American spiral of mounting costs and rising prices has hurt everybody — some more than others. Many have not benefitted from postwar wage increases but have had to share the burden of resulting higher prices. Already millions of American families are unable to buy the things which, in normal times, make up their standard of living.

"In the short view we can see more inflation. In the long view there is danger of depression."

Explaining that production is now steadier and that productivity per workers seems to have started to return to normal, Ford said it was taking this step partly to combat the unwarranted fear that the present cycle of mounting costs and rising prices cannot be corrected without an economic recession.

EXPRESSING a final hope that its suppliers, employees and other economic partners will back the Ford effort to get back to an operating principle of high wages and low prices, Ford promised to reduce prices still further when conditions permit. Actually the psychological effect of the Ford price announcement is likely to have a great influence on the car buyers' pocketbook. Car price comparisons are always dangerous and particularly in the case of Ford v. Chevrolet where one is comparing in most cases an 8-cylinder car with a 6-cylinder car, and there are numerous items such as spare tire, air cleaner, oil filter and electric clocks which may be standard equipment on the Ford but not on the Chevrolet and vice versa.

A comparison of Ford prices as of Jan. 6 and Jan. 17 is given below. Jan. 6 was the earliest date when Ford included a spare tire and the other items mentioned above in its list price. Because of this change in pricing policy, comparison with earlier Ford prices (See THE IRON AGE, Jan. 2, p. 152) are not valid. The following prices apply to the Ford four door sedan delivered at Detroit:

	Jan. 6	Jan. 17	Change
Deluxe 6.....	$1234*	....	...
Super Deluxe 6	1330	$1277	$53
Deluxe 8.....	1287*	....	...
Super Deluxe 8	1382	1366	16

*Temporarily discontinued.

Compared with Chevrolet prices those on the 6-cylinder deluxe Tudor models are now $2 less than that of Chevrolet, while the 8-cylinder models, which account for most of Ford's sales are still somewhat higher than the Chevrolet 6 models.

The Ford union, Local 600, has been fully informed as to the latest price move and the union position, for the moment, appears to be that while this is a step in the right direction, the change will not go far in correcting the disparity in the purchasing power of Ford workers caused by soaring prices.

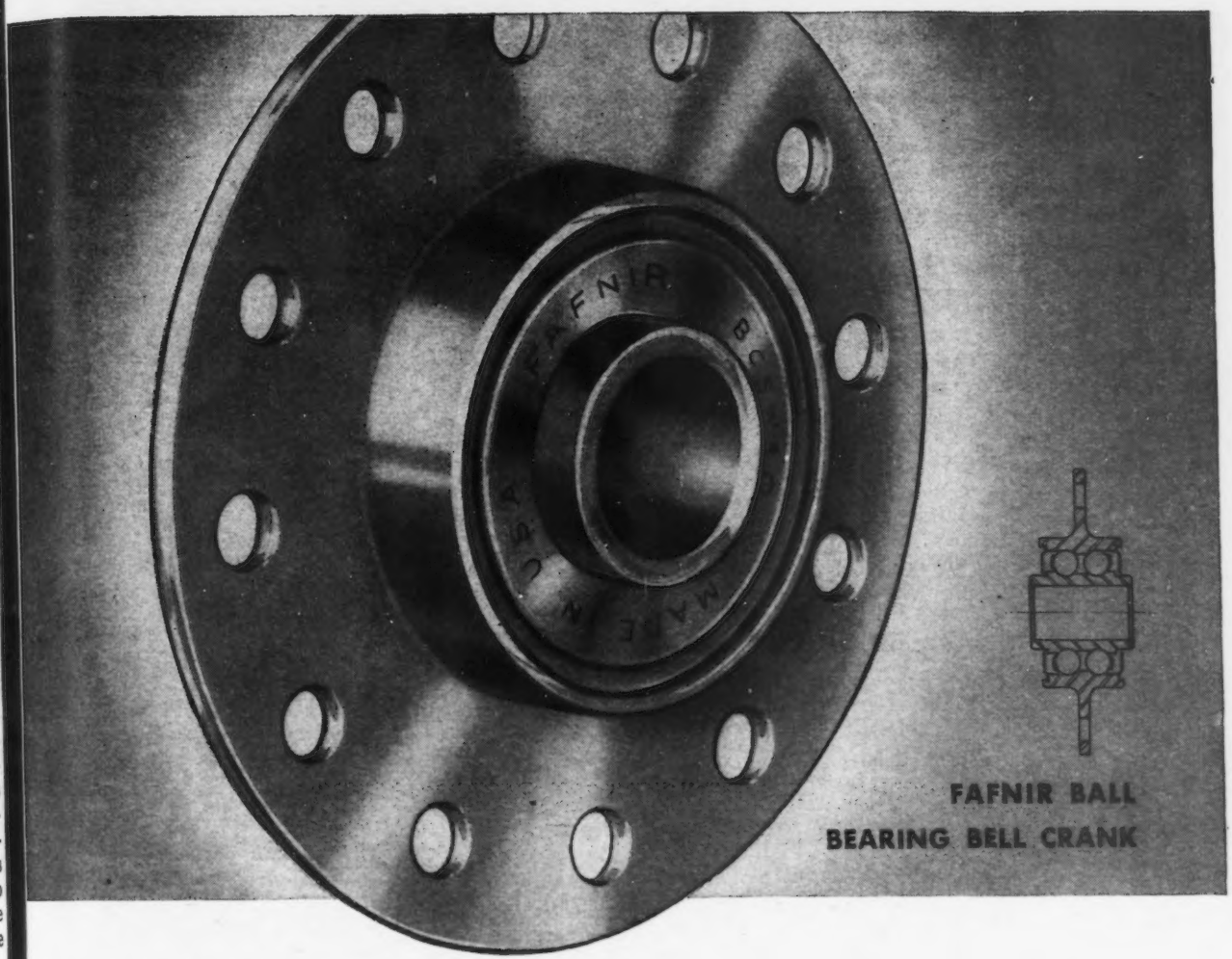
To many Detroiters, the Ford price this week recalled the days when Ford was invariably in front of the industry with announcements about wages, increases in production schedules and changes in car prices. Following World War I it was recalled that a situation somewhat comparable to the present developed in which buyers' strikes were taking hold and Ford dramatically slashed car prices and announced simultaneously that wages would remain at existing levels. To his competitors, this seemed like the rankest kind of heresy, but the public reacted favorably.

Suppliers, however, continued to maintain prices and several months after the Ford announcement many small shops began to close their doors. At this point, Ford announced that maximum production schedules would be put into effect and these schedules were maintained for nearly 2 months when the older Ford shut up shop, and announced that he would stay closed "until the price of steel falls to a reasonable level."

Six weeks later steel prices dropped and Ford started buying again.

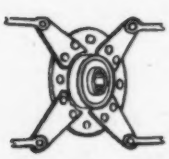
Another possible result of the Ford price cut is the emphasis it gives to the point that the customer as well as workers and management must be given consideration in making industrial decisions. This week, in giving his views as to the kind of labor legislation that should be adopted by Congress young Ford said: "The only way they (the unions) can achieve industrial statesmanship is to recognize that the public is boss and to accept with management equal responsibility under the law."

Ford also went on record as favoring union elections every 2 or



FAFNIR BALL
BEARING BELL CRANK

A ball bearing linkage for transmitting rotating, oscillating and reciprocating motion



- **double-row ball bearings**
- **stainless steel shields or the new Fafnir PLYA-SEALS**
- **flange is tough, shock resisting analysis steel**
- **exposed surfaces cadmium plated**
- **two sizes of bore — .2500 and .3125 inches.**

FAFNIR designed this linkage unit for engine and flight controls in airplanes. Its simplicity, sturdiness, economy and ease of installation and maintenance have suggested a variety of applications to manufacturers of diverse machines and equipment requiring friction-free, positive linkage. Conveniently located flange holes permit attachment to Pitman arms and other mechanical connections to transmit rotary motion into reciprocating or oscillating motion, or vice versa. Flange is integral with the outer ring of this double row ball bearing, providing the rigidity needed to counteract side loads from angularly connected push-pull rods. Fafnir engineering services are available to you in developing the possibilities of this ball bearing linkage unit in your machines or equipment. Either send blue prints or write for data sheets on the Fafnir Ball Bearing Bell Crank. The Fafnir Bearing Company, New Britain, Conn.

FAFNIR BALL BEARINGS

MOST COMPLETE LINE IN AMERICA

4 years instead of annually, and making the labor laws fair to both sides. He said he also believed that the benefits sought through union welfare funds can be better achieved by a good industrial relations program.

"I am not in favor," he said, "of any pension plan or other type of employee security system which relieves the individual of all responsibility and incentive to provide his own security."

NOW that the Ford-Chevrolet battle for supremacy in the first postwar year has ended in a dead heat, Chevrolet production totals give the lead to Chevrolet with 1946 output of passengers and trucks totaling 667,000 units, comprised of 397,103 passenger cars and 270,137 trucks.

Ford production figures show 656,145 units, including 372,917 passenger cars, 198,767 trucks, 70,955 Mercury and 13,496 Lincoln cars. However, based on new car registrations to date it is now questionable whether Chevrolet will be able to overtake Ford sales in this country during 1946. Thus the situation may well turn out that while Chevrolet will be able to claim production supremacy last year, Ford domestic sales may be higher. In that case, each company could claim the distinction of being "First in 1946" which is perhaps a happy ending for a contest as close as was the Ford-Chevrolet race during the past year.

American Can Co. Tells Customers How Tinplate Is to Be Allocated

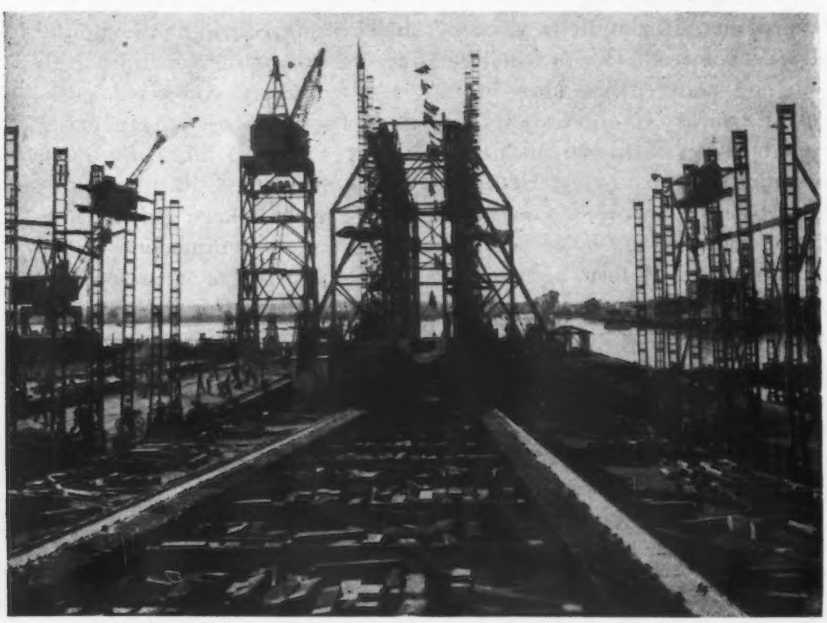
New York

• • • **American Can Co.** has presented to representatives of nine of the major industries served by the company its plan for allocation of containers for 1947. It offers consumers nine alternative methods for determining the base on which their quarterly allotment of tinplate will be figured.

American Can Co. consumers may select as a base 1940, 1941, 1945 or 1946. In calculating their consumption in any one of these years they may establish an alternate base if, for instance, they used some glass and some tinplate. A ninth alternative method of calculating the amount of tinplate which may be purchased in each 1947 quarter is an emergency application in the event that fire or some similar event prevents presentation of a normal buying pattern.

D. W. Figgis, president, American Can Co., said that the company's entire sales staff is engaged in ascertaining from each individual customer the alternative he prefers for his own business and what his volume quota will be under this alternative. As soon as this data is assembled the company will balance the total of all quotas against anticipated quarterly receipts of tinplate. Then it will be possible, Mr. Figgis said, to announce a percentage figure applicable uniformly to the quota of each customer. The percentage may vary from quarter to quarter, depending upon the indicated deficiency of tinplate.

MORE CANS COMING: *The huge tin dredge "Roosevelt," slides down the ways of the Tampa Shipbuilding Co. The craft, with a sister vessel, was built for the Billiton Co., Holland, and will be used in the Netherlands East Indies. Costing* $750,000 *each, the dredges are* 256 *ft long with a* 76*-ft beam and weigh* 1500 *tons.*



Railway Co. Acquires Road from Geneva Steel

Washington

• • • **The Interstate Commerce Commission** has authorized the Carbon County Railway Co. to acquire from the Geneva Steel Co. a 5.8 mile line, extending from a connection with the railway's line at Columbia, Utah, to the Geneva Coal Mine, Horse Canyon.

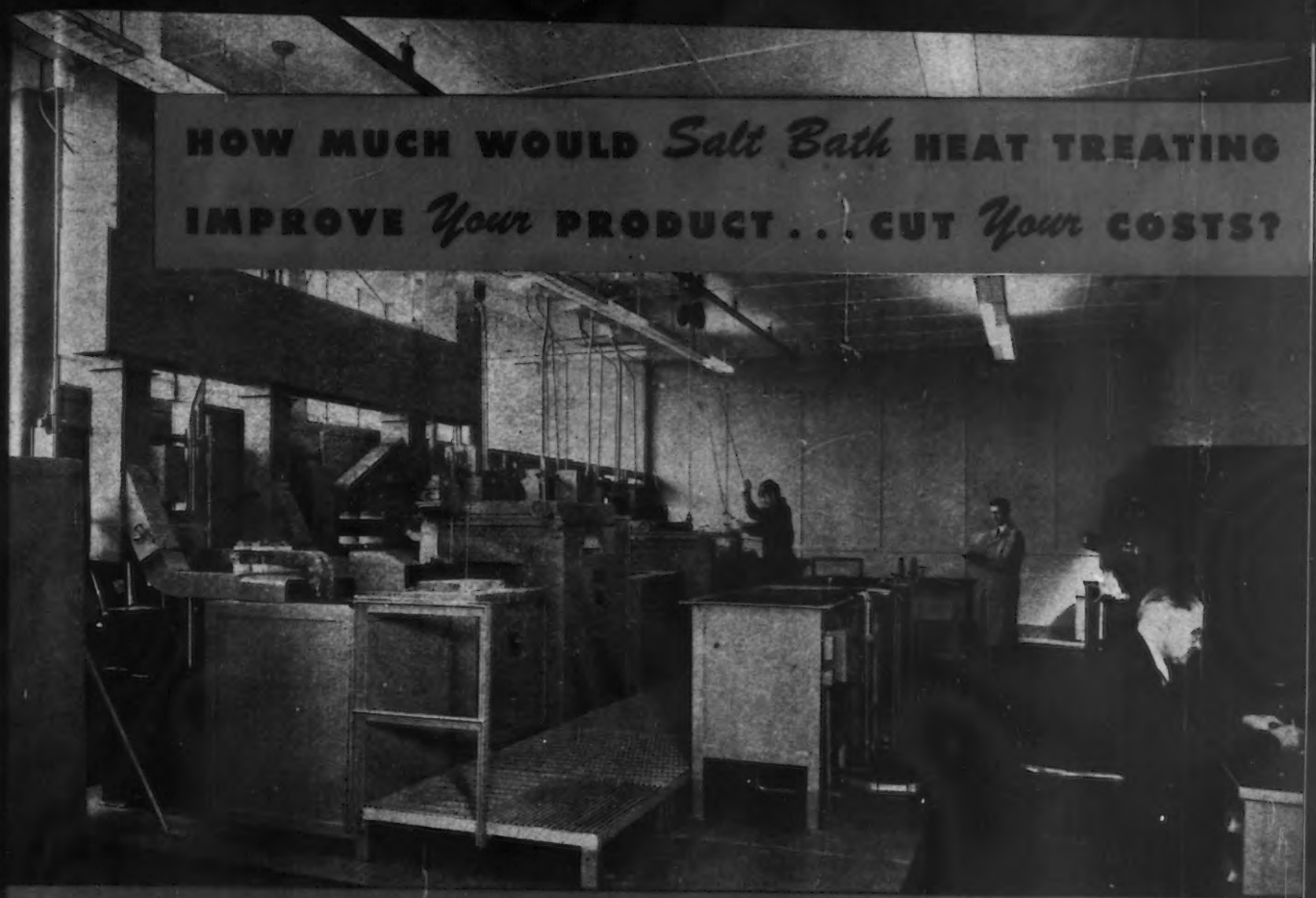
The line was constructed during the war by DPC. It was built primarily for the purpose of transporting coal needed for the operation of the steel mill, and the Carbon County Railway Co., at the request of DPC, has provided service to the coal mine. However, it has not been permitted to provide or offer service or facilities to other coal mines located in the same territory.

RFC to Aid Small Business

Washington

• • • **Small business will** continue to receive from the RFC and the Commerce Dept. the special types of assistance originally provided by the Smaller War Plants Corp., according to a recent ruling of the Attorney General.

Although SWPC did not officially expire until last Dec. 31, most of its small business functions had been transferred to Commerce and RFC by executive order. The Attorney General has ruled that a new executive order is unnecessary to continue these functions which consist largely of helping obtain allocations and surplus property as well as financial aid.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AJAX HULTGREN **ELECTRIC SALT BATH FURNACES**

Washington . . .

L. W. MOFFETT

• Administration moves to iron out labor troubles through mediation rather than by more drastic means . . . Philadelphia plan promoted by Conciliation Service.

WASHINGTON—Submerged in the current flood of labor bills which have been dropped into the hopper of the Congressional mill is a concerted effort on the part of the Administration to cut down labor-management disputes by strengthening and expanding the existing mediation powers of the government.

Centered in the Dept. of Labor's Conciliation Service this work was accelerated about a year ago in anticipation of the end of government control over wage rates and conditions of work.

Recently, the Conciliation Service's efforts have been directed toward putting into effect the recommendations of the Service's 8-man Labor - Management Advisory Committee. In addition, the Service has also actively sponsored the so-called "Philadelphia plan," a voluntary assembly of labor and management representatives, which will actively assist the Service in minimizing or eliminating labor disputes in the Philadelphia area.

Recognizing the importance of voluntary mediation efforts on the part of the government, the President has again recommended the strengthening of the machinery in the Labor Dept. to facilitate collective bargaining and expedite the settlement of labor-management disputes. The President has requested new legislation to achieve this end and an additional appropriation of $1,295,000 to pay for the work.

Back of all these moves is an earnest desire on the part of the Administration to get out of the field of collective bargaining and eliminate the necessity of settling major strikes at the White House level. It is also an attempt to restore some of the Labor Dept.'s lost prestige by limiting the government's role in collective bargaining to one of voluntary mediation through the Conciliation Service.

THE Conciliation Service's Labor - Management Advisory Committee, composed of representatives of the NAM, Chamber of Commerce, AFL, and CIO made its recommendations in December 1946 when it submitted a report on its first year's activity.

Recommended were development of the following mediation techniques: Special conciliators; tripartite mediation, voluntary arbitration and emergency boards.

Conciliation Service Director Edgar L. Warren was quick to put these recommendations into effect and the following is a progress report on the work that has been done:

(1) Special Conciliators — A panel of 26 special conciliators to reinforce the government's staff of full-time conciliators has been appointed. All of these men are considered experts in their fields who could not be attracted to government service on a permanent, full-time basis. Each of them has agreed to leave his regular business to mediate specific disputes. Included in this roster are three former WLB Chairmen, William H. Davis, Lloyd K. Garrison and George Taylor; Nathan P. Feinsinger, Chairman, President's Fact-Finding Board for the Steel Industry; and Joseph Keenan, former WPB Vice-Chairman.

(2) Labor and management advisors will be furnished to aid government conciliators in specific disputes whenever it appears that tri-partite mediation will aid in securing a settlement.

(3) Available for assignment will be 200 arbitrators who have been screened and cleared for competence by the Service's regional Labor-Management Advisory Committees.

(4) The Conciliation Service is also ready to set up Emergency Boards of Inquiry to conduct formal hearings and to make recommendations for settling any dispute that affects the community or national welfare. However, such boards will be used only with the joint consent of both union and employer.

HIGH on the list of the Conciliation Service's devices for settling labor disputes is the "Philadelphia plan." Sponsored directly by the Service, this idea is a new innovation for the Labor Dept.

The "Labor - Management Assembly of the Philadelphia Area" was called together by the Conciliation Service. Its 24 members have been asked to serve for a year to help make collective bargaining work more smoothly. The membership includes 10 management representatives, five AFL, five CIO, two management attorneys, one AFL attorney, and one CIO attorney.

This is not the first time that local groups have been asked to mediate disputes. The first such project in recent years began in Philadelphia in 1933 under the auspices of the old National Labor Board. The Philadelphia idea was carried to Toledo through the efforts of Edward McGrady, then Assistant Secretary of Labor, where it became widely known as the "Toledo plan." It has since been used in other cities with varying degrees of success. Louisville is a recent example.

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Operation: Threading ⅜" to 8" Pipe. **Lubricant:** Sunicut 196.

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The Conciliation Service has studied these plans and has picked the chief sources of strength in each. To this has been added the staff of career government conciliators.

Like the Toledo and other similar plans the Philadelphia Assembly has nothing more behind it than the power of group persuasion, but persuasion from individuals familiar with localized problems.

WHILE similar to the Toledo plan, the Philadelphia Assembly is different in many respects. First, the Assembly is not confined to the boundaries of a single city or single state. It will operate over a territory embracing a large, unified industrial area, including southern New Jersey, eastern Pennsylvania, Delaware and most of Maryland. Secondly, its character is completely voluntary, with no paid employees. Thirdly, it includes a wide and varied membership. It is these characteristics which make the Labor Dept. hopeful of success for the basic idea.

In general, the Conciliation Service expects the initial activities of the Philadelphia Assembly to develop along the following lines.

The Assembly will review the work of the Philadelphia Branch of the Conciliation Service both for the effectiveness of its mediation efforts and for the impartiality of the conciliators. The Assembly will be furnished with complete reports each month on the activities of the branch office.

The Assembly will be asked to assist in the mediation of specific disputes which threaten to disrupt the life or the economy of the area. The director of the Philadelphia office, who also serves as chairman of the Assembly, will bring important disputes to the Assembly when it appears that normal conciliation efforts are failing to bring peaceful settlement. The Assembly will not be asked, however, to sit in judgment on the merits of these disputes.

The Assembly can refer the dispute to a peace panel—a subcommittee of their own group with an equal number of labor and management representatives. This panel will hear the report of the conciliator and the arguments of the union and employer. Then it will attempt to mediate. It will not make any findings or public recommendations.

In disputes vital to the public safety, especially utility disputes, the Assembly may also recommend that the parties consent to presenting their arguments to an Emergency Board of Inquiry which will make recommendations on the evidence presented.

The dispute may also be referred to one of the 26 special conciliators whom the Assembly believes is particularly suited to continue the mediation efforts. Or, it may recommend that the parties agree to voluntary arbitration. However, the Conciliation Service does not expect the Assembly or any panel of its members to be used to arbitrate a dispute.

Basically, the Assembly will attempt to use the four mediation techniques recommended by the Labor-Management Advisory Committee.

Established late last month, the Philadelphia Assembly has already prompted inquiries from other areas, according to the Labor Dept., and it is hoped that the idea will spread.

This innovation on the part of the Labor Dept. will be watched closely by management and labor alike. It was tossed into the labor-management arena at a time when strikes were at their lowest point since VJ-Day. At the close of 1946, approximately 160 work stoppages were in effect, mostly small and localized, involving only 47,000 workers. By contrast, at the end of 1945 nearly 200 stoppages were in progress involving 350,000 workers. Idleness resulting from strikes at the end of the year was only one-eighth as great as during the comparable period for the preceding year.

In addition to these relatively new developments, the Conciliation Service launched an intensive training program for its conciliators during the past year. Periodic "problems conferences" are held in Washington and the seven regions. Part of this effort has been to bring to the staff the viewpoints of labor and management. For example, a representative of either the NAM or Chamber of Commerce has been a speaker in every one of the training sessions. The Technical Division has also been expanded to provide impartial studies on such things as wage incentive plans, workload, job evaluation or similar technical matters.

THE BULL OF THE WOODS — BY J. R. WILLIAMS

S-ST! THE BULL OF THE WOODS!
A LAMPPOST WAS ALL A TOWN CUTUP EVER NEEDED FOR A DRESSIN' ROOM--THEY'LL COME OUT FROM BEHIND THAT COLUMN LIKE BUSY WORKMEN!
LIKE A LOT OF PLAYS, WHAT GOES ON BEHIND TH' SCENES IS CLEVERER THAN TH' SHOW!
1-24
BACKSTAGE
J.R WILLIAMS
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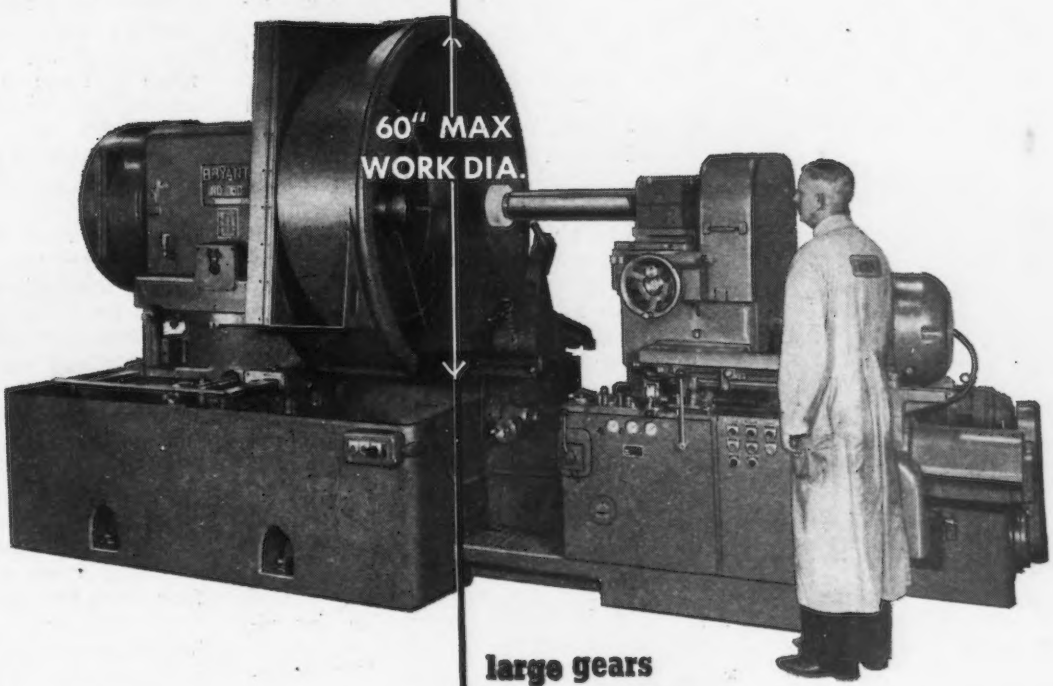
NEW No. 150 HYDRAULIC INTERNAL GRINDER



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large bushings
large bearings
large dies, etc.

Another Bryant Postwar Development for

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In a single chucking, the new No. 150 can grind a bore, or a bore and face—the bore may be either straight or tapered. When grinding a face and straight bore the new No. 150 is particularly advantageous because it assures maintenance of squareness between bore and face. Outside diameters, or outside diameters and faces can also be finished in one chucking. A copy of the new catalog sheet giving full details is yours for the asking.

If you have internal grinding work in the range from 1/16 inch diameter bore to 60" diameter swing, Bryant has machines that will economically meet your requirements. It will pay you to—

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West Coast . . .

ROBERT T. REINHARDT

• Kaiser soda ash plant in southern California to increase alumina production . . . Los Angeles County ups production workers 4.7 pct . . . New Geneva freight rate pleases Utah.

LOS ANGELES—The Henry J. Kaiser interests, building a soda ash production plant in the Owen's Valley, Inyo County, Calif., have been loathe to discuss this development completely. However, it is known that the Kaiser organization has made a contract with the State of California for a 20-year lease for the extraction of 500,000 tons of brine per year from Owen's Lake which is to be converted into approximately 100,000 tons of soda ash per year. Operation is scheduled to begin within the next 60 days, according to the best information available.

It is reported that the Kaiser Co. has made arrangements with a producer of soda ash in the East whereby Kaiser will supply that producer's West Coast customers and in exchange the eastern producer will take care of the requirements of the Baton Rouge, La., alumina plant of the Permanente Metals Corp. The present schedule of production at Baton Rouge is at half capacity inasmuch as it is reported that degree of operation provides enough alumina to keep the Permanente Metals Corp. reduction plant at Mead, Wash., supplied.

Negotiations for the property on which the soda ash plant is built have been carried on with J. C. Fryer, a Los Angeles real estate man.

Two soda ash producers are already located in the Owen's Valley territory. These are the Natural Soda Products Co., subsidiary of Wyandotte Chemicals, Inc., and Columbia Chemical Division of The Pittsburgh Plate Glass Co.

Because of the allocation of soda ash, the Baton Rouge operation was able to supply only 85 pct of Permanente's alumina requirements for reduction at Mead and the new operation is expected to remove the limitations on production there. It is not known if the demand for soda ash at the Baton Rouge plant and in the Kaiser Co., Inc., steel plant at Fontana will utilize fully the production at Owen's Lake and if there will be any surplus available for general sale.

THE past year has been one of substantial expansion for almost all manufacturing industries in Los Angeles County. While employment has increased in most lines, the shipyards have drastically reduced the number of persons on their payrolls, and there has been a slight decline in the aircraft industry, according to the research department of the Security-First National Bank of Los Angeles. Except for aircraft and shipbuilding, all industries combined showed a gain of 21 pct for October 1946 as compared with the same month a year earlier.

Following is the latest data available:

Number of Production Workers in Manufacturing Industries—Los Angeles County

	October 1945	October 1946	Pct Change
Aircraft and Parts	52,200	51,700	— 0.9 pct
Shipbuilding & repairing	26,400	5,000	—81.0 pct
All other industries	153,000	185,700	+21.3 pct
Total	231,600	242,400	+ 4.7 pct

Note: These figures do not include administrative, supervisory, sales, technical, and office personnel.

Nonferrous metals and their products and automobiles and automobile equipment manufacture have shown increases of more than 50 pct in the past year.

Employment at the aircraft assembly and parts plants is now only one-fourth of the wartime peak. Nevertheless, the industry remains the largest in Los Angeles County, employing twice as many workers as any other. Currently, more than one factory worker out of five in the county is employed in this field.

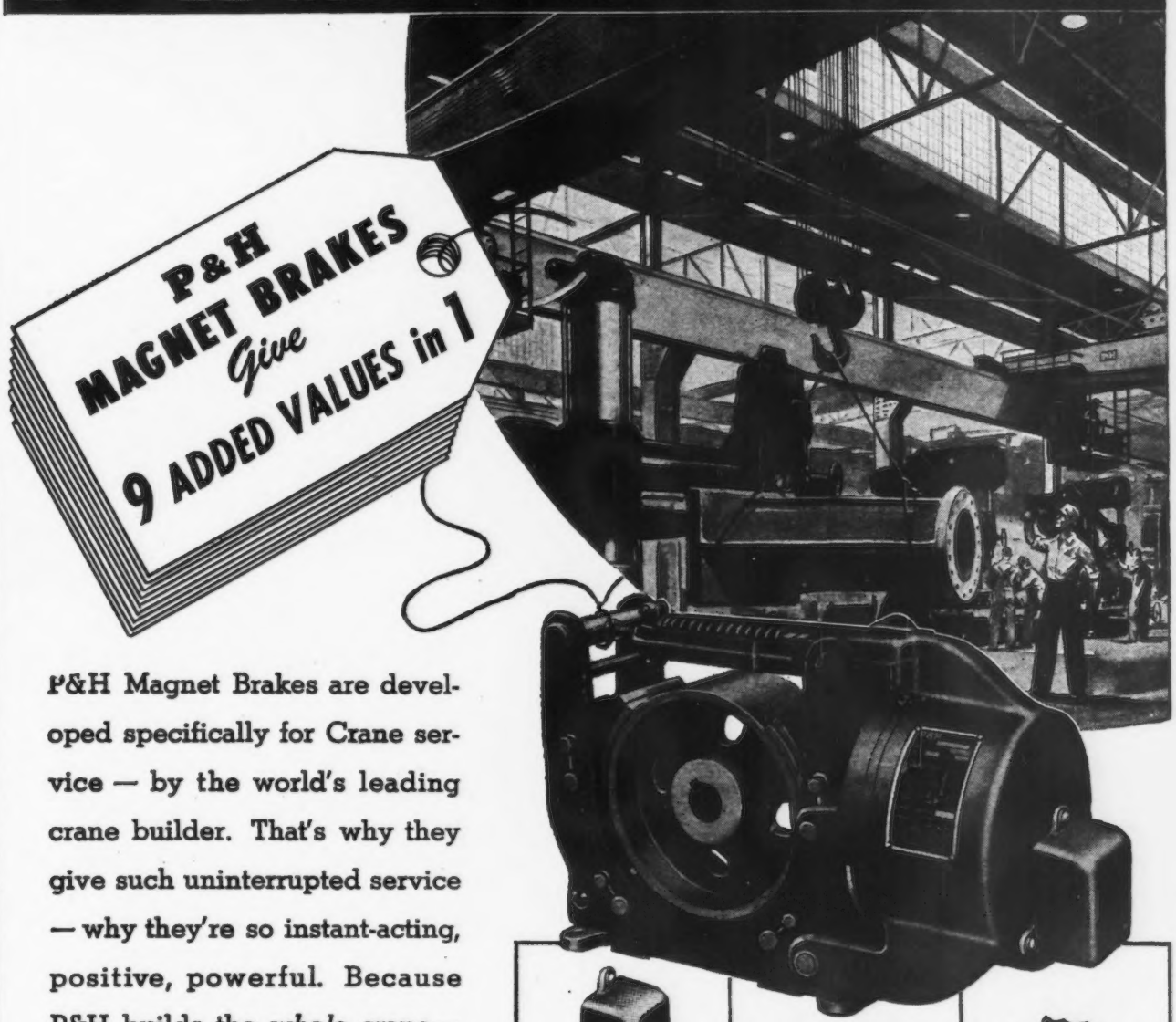
Automobile plants provide an outstanding example of an industry being held back by shortages. Production workers in this line total only 4000 at present as compared with a prewar peak of more than 6000. Trade sources indicate that employment at the local automobile assembly and parts plants might total twice the current figure if the supply situation permitted. When the major new plants and expansions now planned or under construction reach completion and the supply problem is solved, employment in the automobile industry here may reach a figure three or four times the present level.

The number of factory workers in Los Angeles County is now 90 pct larger than in 1939. The corresponding increase for the entire United States is 47 pct.

WILLYS-OVERLAND expects to be in production at its Maywood plant by mid-year. According to company officials, the most modern type of assembly equipment will be used. Station wagons, passenger cars, trucks, and Universal jeeps will be assembled on a one-shift basis geared at 100 units a day. Employment is expected to start with about 700 workers, and additional shifts will be added as needed. Willys-Overland plans to buy a great many of the parts from southern California manufacturers. James J. Welker is in charge of the automotive section of the 375,000 sq ft plant. Prewar production was 11,300 units annually with an employment of 450.

SEATTLE—At least one union is not entering any portal-to-portal pay suits in this area. Seattle Boiler-Makers Union, an AFL organization and largest group of shipyard workers, isn't going to seek such remuneration, according to the union's business agent, A. F.

P&H ELECTRICAL EQUIPMENT . . . HEART OF CRANE DEPENDABILITY



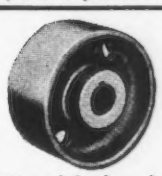
P&H Magnet Brakes are developed specifically for Crane service — by the world's leading crane builder. That's why they give such uninterrupted service — why they're so instant-acting, positive, powerful. Because P&H builds the *whole* crane — electrical equipment and motors included — every crane-engineered detail is an Added Value!

Safety cover *protects* terminals.

Simple, accessible one-*point* adjustment.

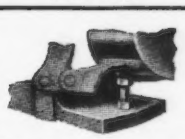
Highest grade *molded* brake linings.

Safety locking arrangement holds all pins *stationary*.



Balanced brake wheel of special *nickel chrome alloy* semi-steel.

No cotter pins to catch on clothing.



Jaw stop insures *equal opening* of both jaws — linings wear evenly and longer.

Designed for floor or motor mounting.

Short, 3/64-inch magnet stroke.

FREE ENTERPRISE MEANS:
Better products—for more people—at lower cost

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O'Neill, who states that the portal pay situation is covered by agreement with employers. The contract allows workers five minutes to change clothes and clean up after work and it is felt by the organization that this pretty well covers the situation and they are willing to let matters rest at that.

On the other hand, the business agent of the Hope Lodge No. 79, International Assn. of Machinists, an independent organization, is recommending that all Puget Sound shipyard workers file portal claims. The agent, I. A. Sandvigen, believes that this will total millions of dollars for these workers. He goes so far as to predict that Boeing employees and many others will collect claims in this area.

At the Boeing plant, the Aeronautical Mechanics Union was in the process of holding an election and consequently its members were not talking much about this policy.

In general, the labor situation in this area continues in a favorable strain with employment in the nonferrous metals industry more than 50 pct greater than it was a year ago and with the manufacturing of light metals products continuing to expand. Transportation equipment continues to be increasing employment as well as is aircraft. Latest manufacturing employment figures show sharp increases over a similar period in 1946, although shipbuilding has declined somewhat.

A lift was given to shipyard employment with the purchase of the No. 3 yard of the Todd Shipyard Corp. by the West Waterway Dock Corp. which plans to use these facilities for an ocean shipping terminal.

During the war this plant was used as an overflow production unit by Todd, taking on the surplus ships from other plants. The purchase includes the pier, 450 ft long and 150 ft wide. There are between 35,000 and 40,000 sq ft of wharfage and rail facilities furnished by the Northern Pacific Railway Co. extending to the face of the pier.

A. R. Van Sant, vice-president of the Lake Washington Shipyards, is president of the purchasing corporation, and Howe S. Foster of the MacLean Construction Co. and the West Coast Painters Co. is vice-president of the new corporation.

The lead in construction activity in the Pacific Northwest was taken late last year by Vancouver, B. C., with residential and business construction valued at $2,425,130 under way. This figure was double that of Seattle and Portland.

SALT LAKE CITY—Geneva Steel Co. officials declined to comment on the action of four railroads in agreeing to a $9.60 rate on finished steel to San Francisco, Los Angeles and Portland and a $10.80 rate to Seattle. But except for the Seattle rate it was exactly what U. S. Steel Corp. asked for plus the 20 pct blanket increase put into effect as of Jan. 1. While the corporation asked for the same rate to Seattle as to the other Pacific Coast points, some of the officials privately expected the railroads to retain the old differential of $1.20.

Governor Herbert B. Maw promptly congratulated the railroads which agreed to the rate adjustment. And Dr. J. R. Mahoney, director of the University of Utah's bureau of business and economic research and long-time student of western steel production potentialities, described the new rate as, "the last obstacle to the success of the Geneva operation."

"The next step," he added, "is to get a proper rate structure on fabricated steel products from central Utah to all parts of the West so that those manufacturing industries which are logical for this area can locate here."

During the past week the sixth of the nine openhearth furnaces at Geneva was lighted; and both the structural and slab mills were boosted from five to ten turns per week.

The third blast furnace is still down for repairs. Present prospect is that the repairs will be completed before the incoming coal supply will be adequate to maintain operation of all three blast furnaces.

SAN DIEGO—The first Navy combat plane to be powered by a gas turbine engine turning a propeller—and the second of its type in this country—was announced by Ryan Aeronautical Co. The XF2R-1 is serving as a flying laboratory to obtain operational experience with this new type power plant, its propeller and other engine accessories.

Although performance figures are restricted, the plane is said to have much greater speed and climb than the Ryan FR-1 Fireball. The plane uses a 2-engine power plant combination, with the front engine turning a propeller. Power for the propeller is supplied by a General Electric TG-100 gas turbine "propjet" engine. A separate thermal jet engine installed in the aft fuselage section supplements power of the propeller.

Overall length is 36 ft. Other dimensions withheld by the Navy.

o o o

HEAVY HOISTER: *Base section of a huge crane displacing* 5000 *tons and capable of lifting* 350 *tons which the U. S. Navy has acquired from the Germans. It is one of two captured by the British at Kiel and is being reassembled at San Pedro, Calif. A third which the Nazis were building for the U. S. S. R. was found incomplete and the remaining one was sunk at Hamburg. (Official U. S. Navy photograph).*

o o o

Designed for SHOCK PROOF ROTARY POWER

● The "Floating Drive" in these unique motors *eliminates* shock troubles! The punishment and abuse of constant starting, stopping, braking, acceleration and reversal can't damage it! There are no mechanical linkages of any kind between the driving and driven elements—yet the driving element is in *constant pressure* contact with the driven element at all times!

A speed-control valve assembly can be added to permit presetting of the motors at any rpm within their capacity, and gear-head units (as illustrated) are available in a variety of gear ratios. For highest efficiency on rapid-traverse needs, a plunger device built into the speed-control valve permits instant acceleration from any preset speed to full speed. Motors resume preset speeds instantly upon release of the plunger, which may be activated by lever, cam or linkage arrangement.

These motors have no "dead-center" positions—they start instantly when pressure is applied. They are also fully self-lubricating, with or without the gear-head and speed-control assemblies. Available in 3 and 5 hp sizes, with gear heads in 3:1, 1:3, 1.5:1 and 1:1.5 ratios. Write for complete details.

DENISON *Hydroilic*

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DENISON EQUIPMENT for APPLIED *Hydroilics*

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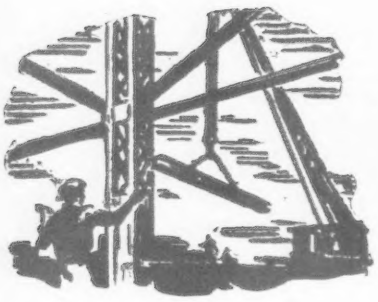
European Letter . . .

JACK R. HIGHT

• Federation estimates steel output in 1947 between 14.5 million and 15.1 million ingot tons . . . Say imports will reach 840,000 net tons.



LONDON—As a part of its continuing campaign to save the British iron and steel industry from the Labor Government's plans for nationalization, the British Iron & Steel Federation has issued an optimistic production program for 1947 which states that production for the year will be between 14,560,000 ingot tons and 15,120,000 ingot tons, compared with 14,212,000 ingot tons in 1946 and 13,242,000 ingot tons in 1945.

According to more conservative sources, the industry will be extremely fortunate if, in the face of continuing coal and labor shortages, it is able to achieve a production of 14,545,000 ingot tons, although it is admitted that under favorable circumstances 15,400,000 ingot tons could be produced. The highest output by the British industry in any peace year was 14,522,000 ingot tons in 1937.

The output of steel during the past year was affected to the extent of nearly 560,000 ingot tons because of a shortage of coal, and there is no substantial promise of any better coal situation in the coming year. To combat the coal shortage, rapid conversion to oil firing is being undertaken in some areas. Capacity using 448,000 tons of oil will have been converted by the end of the first quarter in 1947, and the industry expects to be using oil at the rate of 1,120,000 tons annually before the end of the year.

According to the federation's statement, imports of ingots and semifinished material during 1947 from British Dominion and "other sources" will total 840,000 net ingot tons. The composition of this optimistic guess is not revealed, but it is known here that there is a backlog of 492,000 tons in orders from the United States, plus a backlog of 224,000 tons in old orders from Australia.

The best information that the British Ministry of Supply which places foreign orders has on the subject is that the U.K. mills will be extremely fortunate if they receive 672,000 tons in imports during the year, as no one here acquainted with the steel situation in America seriously hopes to receive more than is already in the backlog, and most sources consider that to be an unfounded hope. This is about equal to the minimum prewar import. The situation in Australia is, if anything, worse and Canada has stated that it is unable to assist.

DURING 1947 only steel exports declared essential by the government will be permitted. The federation states that as a result exports for the year are likely to total no more than 1,120,000 ingot tons or even less, but export quotas for Britain for the first quarter are known to be computed on the basis of an annual rate of only 896,000 ingot tons. The steel trade association is counting heavily on 280,000 ingot tons of war surplus steel still held by the British Government, but actually only about 112,000 ingot tons of this material is new steel which will be available to replace other products.

The remainder is scrap material of relatively less value. On the basis of 15 million plus tons of production and the 840,000 ton import figure, the federation estimates that there will be ample supplies of steel available for home consumption during 1947, somewhere between 14,560,000 tons and 15,120,000 tons.

A feature of the serious British steel supply position was the marked rise in domestic demand for steel during the latter half of 1946. During the 12 months, June 1945 to June 1946, home steel consumption was running at the rate of approximately 12,320,000 ingot tons. During the last 6 months of 1946 home consumption rose rapidly to a rate of 12,880,000 ingot tons.

THE steel industry in the early part of 1946 exported a very considerable tonnage of steel. In the middle of last year it was recognized that a heavy demand for steel was bound to materialize over the following months and continue thereafter. A reduction of exports was made almost at once, and the steel was diverted to U.K. industries.

This diversion of steel permitted some major consumers, including the shipbuilding and motor car industries, to maintain their ascending production curves. On the other hand, large numbers of somewhat less conspicuous users have in fact been cut to the bone in their steel allocations, with some engineering industries being restricted to 25 pct of their estimated requirements.

The motor industry along with others has been given its steel allocation for the first quarter of 1947. If the allocation for the first quarter is maintained for the year, 400,000 cars will be produced, according to the steel federation. The best prewar passenger car production figure was 389,633 in 1937.

The British Iron & Steel Federation indicates that it is hoped to increase the motor car allocation later in the year, but no indication is given as to the possible source for increased supplies which are the bottleneck for the automobile industry. The addition of various optimistic estimates made by the federation as to the year's output is used as a basis for the assumption that the steel position of domestic consumers may improve during 1947. The total availability for U.K. industries is estimated at 14,840,000 tons, while in the peak year of

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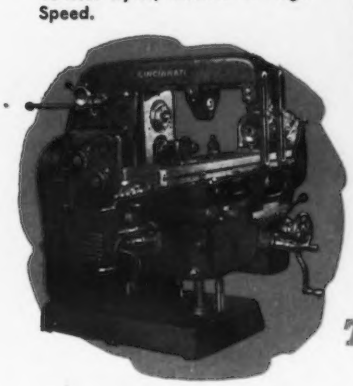
Speed and Feed Change Lever. Just engage the lever and the gears shift by power. There's one at the front, and another at the rear working positions.

● When you select a milling machine for a wide variety of work, don't overlook the basic considerations of low-cost production. A penny saved here and there can build up to an impressive profit in your statement of operations. ¶ For example, take cutting speeds and feeds. In a variety of small lot milling operations, the correct speeds and feeds result in many small savings—sometimes big ones. And the CINCINNATI Dial Type method of selecting speeds and feeds—by power—is the most economical, yet the easiest. The operator doesn't have to walk a step, whether he's working at the front or behind the table. Because it's easy to change speeds and feeds, he keeps the machine working at top efficiency. And CINCINNATI Dial Type Millers have many other features that contribute to low-cost production. Catalog M-1499 gives you the complete story.

● Above: Milling a slot in a steel bar. It's easy for this Dial Type operator to save time by increasing speeds and feeds for the finishing cut.

Below: CINCINNATI Dial Type Milling Machines are available in Nos. 2, 3 and 4; Plain, Universal (illustrated below) and Vertical styles; Medium or High Speed.



Left: Rough and finish milling one side of a fixture body. The operator saves time by changing speeds and feeds right where he stands—at the rear working position of his Dial Type Miller. ●

THE CINCINNATI MILLING MACHINE CO.

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MILLING MACHINES • BROACHING MACHINES • CUTTER SHARPENING MACHINES

1937 the figure was 13,014,000 ingot tons and in 1939, when war programs dominated, the tonnage available for home consumption was 14,348,000 tons. The exact figures for 1936, 1937, 1938 and 1939 are as follows:

1936—12,056,000 ingot tons 1937—13,015,000 ingot tons 1938—10,356,000 ingot tons 1939—14,348,000 ingot tons	Average 12,443,750 ingot tons.

THE federation believes the overall flow of steel to consuming industries during 1947 will not be far out of line with their ability to use it, despite the protests, loud and soft, of many of the consumers. Government officials who operate the steel priorities and allocations systems line up solidly with the theory that many steel consumers will not get anything approaching their requirements.

To defend its position, the federation points to the limitations imposed by the shortage of fuel, and transport difficulties, which must also restrict manufacture of steel using articles, such as motor cars, ships, railway rolling stock, housing and domestic requirements. There is a serious timber shortage which cannot be easily overcome, and steel is being used as a substitute. That this may in some cases become permanent is accepted by the steel industry, as for example for steel coalpit props.

The view of the British Iron & Steel Federation is that if more steel is available, for example, from a better raw material position at home or from an increased flow of imports, it ought to be possible to increase the direct export of steel above the figure given and thus reduce the sacrifice of overseas goodwill at present being made in favor of home consuming industries. The steel association did not mention the fact that, if it is possible to limit the allocation of steel to home sources while increasing the export allocations, profits will go up due to the fact that export prices are uncontrolled and are at a level substantially above the domestic price range.

In a blanket reply to charges of specific steel shortages, the federation avers that, when difficulties occur, these are more likely to be due to temporary aberrations rather than any overall shortage, and to the fact that, owing to the war interruption of peacetime industries, normal stocks of steel have been run out. The trade association notes that it will not be possible to build up depleted stocks of steel in consuming industries.

Formal Presentation

Paris

• • • **The proposal for nationalization of the French iron and steel industry announced by the Communist Party last autumn (see THE IRON AGE, Oct. 10, p. 120) has now been formally presented to the National Assembly in a proposed law. Outside the Communist Party there is still no known support for this measure, and steel shares on the French stock exchange showed no noticeable reaction to the announcement.**

French steel shares have taken a definitely stronger trend during the late months of 1946. in contrast with their weak position in the beginning of the year.

Italian Auto Industry Falls Far Behind Quota

Paris

• • • **Reports on the** Italian automobile industry for the first three quarters of 1946 indicate that producers there were falling behind their quotas. Total production in the industry was to have been 69,000 units, made up of 18,500 passenger cars, 18,000 light trucks, 32,000 heavy trucks, and 20,000 "baby" passenger cars. Latest reports were that the passenger unit production program was running at about 23 pct of the goal.

An estimate has been made of the needs of the Italian railways for reconstruction purposes which indicates that approximately 150,000 freight cars, 1200 locomotives, and 6700 passenger cars will be required for the job. In addition the right of way has decreased from 17,000 km in 1940 to 14,800 km at present.

It is estimated that 500 billion lire (about $2 billion) will be required to complete the job, and a 3-yr plan has been drawn up which will employ 330,000 workmen to do the job.

November Steel Ingot Production in Canada Advanced to 73.8 Pct

Toronto

• • • **Production of** steel ingots and castings in Canada rose sharply during November to total 222,644 net tons or 73.8 pct of rated capacity, and compares with 123,841 tons or 41 pct in October and 207,981 or 68.9 pct in November 1945. During the month under review output included 216,830 tons of steel ingots and 5814 tons of steel castings.

Steel furnace charges in November included 108,318 tons of pig iron; 64,790 tons of scrap of consumers' own make, and 69,154 tons of purchased scrap.

For the 11 months ending with November cumulative production of steel ingots and castings totaled 2,097,331 net tons, compared with 2,662,042 tons in the 1945 period and 2,780,928 tons in 1944.

Following are comparative monthly production figures for 1946 in net tons:

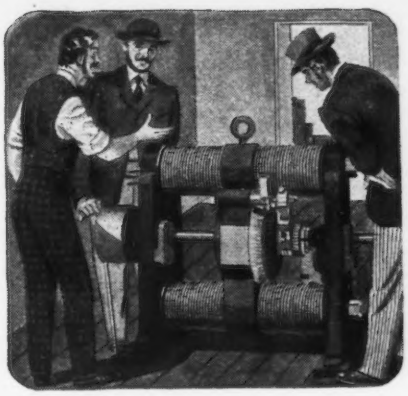
	Steel Ingots	Steel Castings
January	236,479	8,144
February	226,273	7,620
March	240,589	8,528
April	239,463	8,056
May	251,697	7,929
June	208,296	6,565
July	130,754	5,160
August	82,707	6,022
September	71,363	5,201
October	117,669	6,172
November	216,830	5,814
Total, 11 months.	2,022,120	75,211

Czech Industries Pay Tax

London

• • • **The Czechoslovak** Minister of Industry has announced in the government's *Economic Bulletin* that, although the industry showed a loss during 1946, the nationalized metal trades paid 290 million crowns ($5,800,000) in special "profits" tax. The mines, which also operated at a loss under their first year following nationalization paid a special profits tax of 216 million crowns ($4,320,000).

From a "turnover" tax the govenrment obtained 350 million crowns ($7,000,000) from the mines, 150 million crowns ($3,000,000) from the smelting works and foundries, and 540 million crowns ($10,800,000) from the metalworking industry. From all the nationalized industries the government collected 5 billion crowns ($100 million) from these two tax measures.

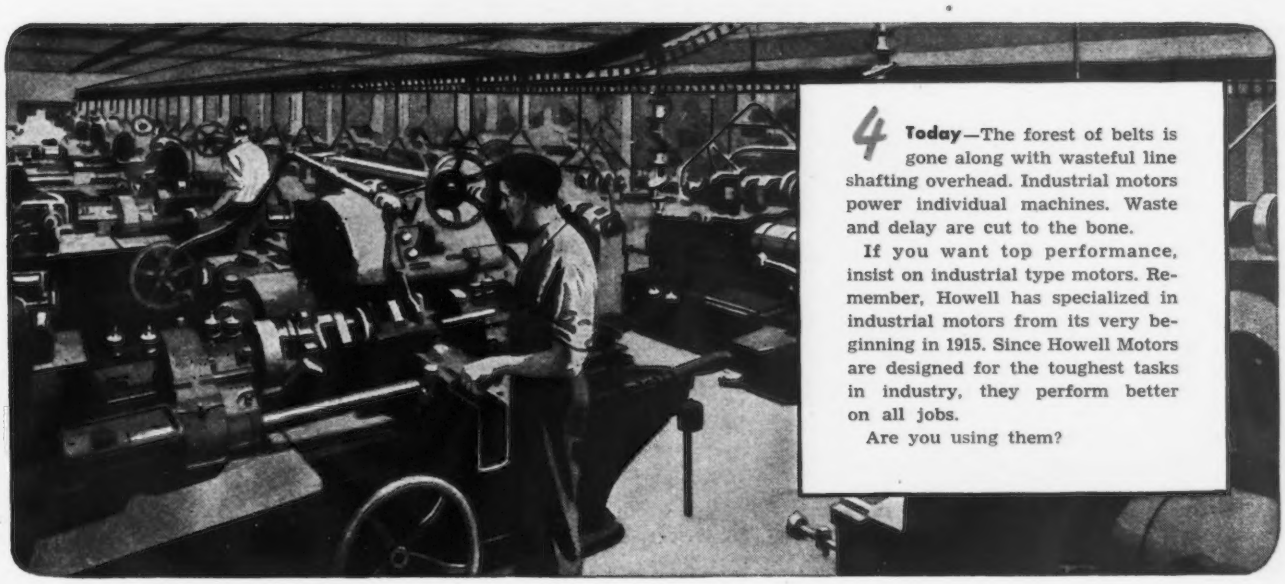


1 **1870**—The first electric motor was discovered by accident. Its invention revolutionized the lives of millions. Graphically, here's how its development changed you from a walker to a rider.

2 **1897**—The first automobiles were built by "hand." They were a luxury for the few. Mass production methods with batteries of electrically driven machines to cut manufacturing costs were still to come.

3 **1925**—Mass production had arrived. Machines driven by electric motors were more extensively used. Prices of cars came down. Walkers became riders. But shops looked like a forest of belts.

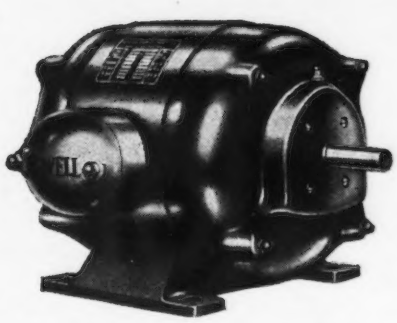
"Presto! and out went the forest of belts"



4 **Today**—The forest of belts is gone along with wasteful line shafting overhead. Industrial motors power individual machines. Waste and delay are cut to the bone.

If you want top performance, insist on industrial type motors. Remember, Howell has specialized in industrial motors from its very beginning in 1915. Since Howell Motors are designed for the toughest tasks in industry, they perform better on all jobs.

Are you using them?



Howell Protected Type Motors available in sizes 5 h.p. and smaller. Also other Howell industrial type motors available up to 150 h.p.

HOWELL MOTORS

HOWELL ELECTRIC MOTORS CO., HOWELL, MICH.

Manufacturers of Quality Industrial Type Motors Since 1915

PERSONALS

° ° °

• **George J. Edellstein** has been named purchasing agent for Willys-Overland Motors, Inc., Toledo. Mr. Edellstein has been associated with Willys-Overland since 1923. He was appointed assistant purchasing agent in 1934. **Kenneth Mensing** will succeed Mr. Edellstein as assistant general purchasing agent.

• **Dr. Laurence C. Hicks** has been made assistant director of research of the Allegheny Ludlum Steel Corp., Pittsburgh. Dr. Hicks, who has been with the organization since 1933 was associate director of research in charge of magnetic steel and allied products at the time of his promotion. **John H. Crede,** who served in the research laboratory at Brackenridge, Pa., as metallurgist since 1935, has been appointed to succeed Dr. Hicks as associate director. **Claude M. Sheridan** has been appointed associated director of research in charge of stainless steel and allied products, and **William J. Baldwin** has been appointed chief plant metallurgist at the Watervliet, N. Y., plant, succeeding **Ralph P. DeVries,** who retired Jan. 1.

• **John P. McWilliams** has been elected to the board of directors of Union Carbide & Carbon Corp., New York. Mr. McWilliams is president and director of Youngstown Steel Door Co.; and a director of National City Bank of Cleveland, of Youngstown Sheet & Tube Co., and of the Goodyear Tire & Rubber Co.

• **E. J. Harrington** has been named manufacturing manager of the affiliated manufacturing companies department of the General Electric Co., Schenectady, N. Y. **Roy W. Johnson** has been made marketing manager of the new department.

• **Everett W. Bickford** has been appointed manager of the employee relations division of the General Electric Co.'s chemical department, Pittsfield, Mass. Also, **Arthur G. Sanford** has been made supervisor of personnel for the department.

• **W. F. Boyle,** who has been general manager of the Pelton Water Wheel Co., San Francisco, a subsidiary of the Baldwin Locomotive Works, has been named vice-president of that company . Mr. Boyle has been Baldwin's Pacific Coast district sales manager as well as general manager of Pelton.

• **Donald A. MacNeil** has joined the sales staff of the forging division of Tube Turns, Inc., Louisville, Ky. He will make his headquarters in Chicago.

JULIUS E. GRAF, chief engineer, Jones & Laughlin Steel Corp.

• **Julius E. Graf** has been appointed chief engineer of Jones & Laughlin Steel Corp., Pittsburgh, and its subsidiary companies. He has been assistant chief engineer of the corporation for the past 6 yr and succeeds C. W. Littler who retired Dec. 31, 1946. Mr. Graf was for many years in the engineering division of the American Sheet & Tinplate Co., and the Carnegie-Illinois Steel Corp. From June 1945 to June 1946, Mr. Graf was in Germany serving as chief engineer of the metals section in the economics division of the Office of American Military Government. For his services he was awarded the Army's Medal of Freedom on Jan. 3, 1947.

• **A. T. Cowan** has been appointed general manager of Morrow Mfg. Co., Wellston, Ohio, a subsidiary of McNally Pittsburg Mfg. Corp. Mr. Cowan succeeds **Frank C. Morrow,** who with **Ford R. Morrow,** will retire from management of the firm.

• **Robert K. Larrabee** has been appointed machinery sales representative of Joseph T. Ryerson & Co., with headquarters in Detroit.

• **William D. Kennedy,** who joined Ford Motor Co., Dearborn, Mich., a year ago as director of publications, has been appointed public relations director for the Ford Motor Co.

• **J. S. Cude,** formerly personnel and safety manager at the Birmingham plants of Southern States Iron Roofing Co., has been named assistant personnel director for the company with offices at Savannah, Ga. **Robert R. Jones,** formerly associated with Rheem Mfg. Co., succeeds Mr. Cude in the position he held at Birmingham.

• **Francis M. Sherwin** has been elected president of Brush Beryllium Co., Cleveland, and **Frank T. Humiston, Jr.,** has been made treasurer and assistant to the president.

• **R. T. Stafford** has been appointed assistant to vice-president W. C. Johnson of the Pittsburgh works of the Allis-Chalmers Mfg. Co. Mr. Stafford has been assistant manager of the electrical department in charge of the engineering and commercial activity of the Pittsburgh works since 1928 and will operate out of New York in his new capacity. He joined Allis-Chalmers in 1905 as a salesman in the firm's Buffalo district office. **J. W. McMullen** has been appointed general manager of the same plant of Allis-Chalmers Mfg. Co. Mr. McMullen has been assistant manager of the Pittsburgh transformer section since March 1945. He began with the Pittsburgh Transformer Co. in 1917, was transferred to the sales department in 1925 and continued in that capacity when Allis-Chalmers absorbed the Pittsburgh firm in 1928.

• **Jay G. Coutant** has become associated with the Barium Steel Corp., Canton, Ohio, and will supervise the fuel and refractory activities of the Barium subsidiaries in the steel and allied industries.

• **William H. Meyer** has been appointed metallurgist and sales engineer of the Ohio Industrial Steel Co., Dayton. Mr. Meyer was formerly associated with the Copperweld Steel Co. as field metallurgist.

• **E. H. Worth** has been elected chairman of the board, Worth Steel Co., Claymont, Del. **W. A. Worth** was elected president and **P. M. King, W. P. Worth** and **R. M. Worth** were elected vice-presidents. **E. H. Worth, Jr.,** was made treasurer; **P. O. Zwissler,** manager of industrial relations, and **A. W. Williams,** general manager of sales.

• **William R. Balph** has been appointed works metallurgist, Cuyahoga works, Cleveland, of American Steel & Wire Co., and **Stuart J. Kelley** has been appointed division metallurgist in the cold roll department at the same plant, succeeding Mr. Balph. Mr. Balph has been associated with the company since February 1936, and has been cold roll division metallurgist since May 1944. Mr. Kelley started with American Steel & Wire in June 1933 and was made product metallurgist at the Cuyahoga works in February 1943.

• **Edward A. Ledeen,** formerly chief engineer of Gotham Engineering Co., has been named general manager of Production Methods, Inc., of New York.

• **G. Rider Neff** has been made vice-president in charge of sales and **Frank G. Kaufman** has become vice-president in charge of product engineering, of Cleveland Cap Screw Co., Cleveland. Both have been associated with the company for several years.

G. RIDER NEFF, vice-president in charge of sales, Cleveland Cap Screw Co.

• **Marx Kristek** has been named superintendent of Buick's final assembly building. He succeeds **Frederick G. Hoelzle,** who retired Jan. 1 after 40 yr of service with Buick, a General Motors division. Mr. Kristek joined Chevrolet in 1930, and came to Buick in 1941.

• **John E. Garlent,** executive vice-president of Motor Wheel Corp., Lansing, Mich., since 1940, and associated with the corporation since 1920, has been elected president of the corporation. Mr. Garlent succeeds **Harry F. Harper,** who resigned. He was president and general manager of the corporation since its inception in 1920.

• **G. Lawton Johnson** has been appointed assistant general manager of sales of National Tube Co. Mr. Johnson will handle the sale of products manufactured at Christy Park works, McKeesport, Pa., and some of the company's other fabricated products. He was a sales engineer for the Midwest Pipe & Supply Co. and later was manager of eastern sales for the Graver Tank & Mfg. Co., both in New York.

• **Maurice J. Hoke** has been appointed chief engineer of the crankshaft and camshaft divisions of Ohio Crankshaft Co., Cleveland. Mr. Hoke will be in charge of all processing and development work in these divisions of the company. He came to Ohio Crankshaft in 1944 from the Consolidated Vultee Aircraft Corp., Miami division.

• **Frederick D. Schreiber,** formerly general superintendent of the Pittsburgh Coke & Chemical Co. at its Neville Island, Pittsburgh, operations, has been made manager of the coal chemicals division. **John R. Comstock** will be general superintendent of operations at Neville Island to fill the position formerly held by Mr. Schreiber.

• **Carl E. Lyon** has retired as vice-president and director of purchases of the Cribben & Sexton Co., Chicago. However, he will continue his association with the company in an advisory capacity.

• **Jerry J. Tobias,** vice-president of Allen Industries, Inc., Detroit, has been named general manager of all company operations in its five plants. Mr. Tobias has been with the firm since 1930.

• **W. R. Dabney,** for the past 10 years sales manager of Ironite Ironer, Mt. Clemens, Mich., has been appointed vice-president.

• **W. J. Buchanan** has been named traffic manager for the three Detroit plants of the Budd Co.

• **Edward R. Anderson** has been made district manager for California, with offices in Los Angeles and San Francisco, for the Hendey Machine Co. For many years Mr. Anderson acted as sales and service engineer for Hendey in their Chicago office.

• **James E. Kendig,** who has been associated with Acme Aluminum Alloys, Inc., since 1941 as a member of its engineering staff, has been appointed manager of Acme's newly established eastern sales division. His headquarters will be in Philadelphia.

• **Kier M. Boyd** has been appointed assistant manager of sales, strip and sheet products, of Jones & Laughlin Steel Corp., Pittsburgh. Mr. Boyd has been with Jones & Laughlin for 20 years, having started with the company in 1926. For the past 10 years, he has been chief clerk of strip and sheet product sales department. **Charles Potter** has been appointed manager of the J&L Pittsburgh warehouse. He succeeds **J. M. Hilbish** who has retired after 28 years of service with the company.

KIER M. BOYD, assistant manager of sales, strip and sheet products, Jones & Laughlin Steel Corp.

• **Arthur W. Carlson** has been named bridge engineer of the Western Pacific R.R., San Francisco, to succeed **Col. H. M. Smitten** who retired last month. Mr. Carlson entered the employ of the Western Pacific in December 1937, as a draftsman in the engineering department. He was promoted to structural draftsman in 1941, and to assistant bridge engineer in 1944.

• **Edward M. Dooley,** labor relations director of the Parke, Davis & Co., Detroit, has been named director of industrial relations. He was formerly industrial relations director of National Bronze & Aluminum Co., Cleveland, and personnel manager of the Wright Aeronautical Corp., Cincinnati. **Leo F. Thompson,** former employee relations manager of Wright, was named assistant director of industrial relations of Parke, Davis.

• **Charles B. Lansing, Jr.,** formerly assistant secretary and assistant treasurer of the Ferry Cap & Set Screw Co., Cleveland, has been elected treasurer. Mr. Lansing has been with Ferry Cap for the past 12 yr, having joined the company January 1935, as cost clerk.

D. B. BAXTER, whose appointment as Pittsburgh district sales manager, Basic Refractories, Inc., was announced in the Jan. 9 issue.

• **Kenneth T. Fawcett** has been appointed vice-president of Dominion Brake Shoe Co., Ltd., St. Thomas, Ontario, a Canadian subsidiary of American Brake Shoe Co. Mr. Fawcett has been associated with American Brake Shoe since 1934 and has been assistant general purchasing agent since 1944.

• **Sam J. Leo** has resigned as president of American Petrometal Corp., Long Island City, N. Y. Mr. Leo had been president of the firm since 1937. He will be succeeded by **Victor J. Leo,** who will assume the role of president of the company. Victor Leo has been connected with the company since its inception in May 1922.

• **William I. Myers** and **Frank L. Elmendorf** have been elected directors of the Continental Can Co., New York.

• **G. E. Locke** has been named director of purchases of Motor Products Corp., Detroit. Included on Mr. Locke's staff will be **George G. Stellman,** purchasing agent; **Hobart F. Marling,** material control; and **Frank W. Durand,** materials followup.

• **Robert B. Mears** has been appointed research laboratory manager in the research and development division of Carnegie-Illinois Steel Corp., Pittsburgh. He succeeds **E. S. Taylerson** who recently became supervisor of engineering research for the company. Dr. Mears since Oct. 1, 1946, has been at the U. S. Steel research laboratory at Kearny, N. J.

...OBITUARY...

• **William E. Hartman,** 72, died on Jan. 13. Mr. Hartman had been associated for the past 6 years with the Wilputte Coke Oven Corp., New York.

• **Carl E. Wallander** died on Jan. 7 after a brief illness. For 16 years he represented the Kensington Steel Co., Chicago, in Indiana, Ohio, Pennsylvania and western New York State.

• **Samuel Farrell,** Pittsburgh representative of the Rollway Bearing Co., Inc., for the past 25 years, died suddenly on Jan. 10.

• **John Harsch,** 78, founder and president of the John Harsch Bronze & Foundry Co., Cleveland, died on Jan. 6. Mr. Harsch worked in foundries in Cleveland before organizing his own company in 1918.

• **William R. King,** associated with the Wm. K. Stamets Co., Pittsburgh, for 30 years as sales engineer and sales manager, died Dec. 30.

• **Elisha H. Cooper,** 78, chairman, Fafnir Bearing Co., New Britain, Conn., died Jan. 4. He joined the company in 1911 as secretary, treasurer and general manager and a few years later became president. In the late twenties he became chairman of the board.

• **John W. Bray,** 79, director and vice-president in charge of sales of the Bullard Co., Bridgeport, Conn., died Jan. 3. He had worked for the firm since 1884 when he started as an apprentice.

• **E. A. Holmgreen,** 82, president and founder of the Alamo Iron Works, San Antonio, Tex., died suddenly Jan. 4.

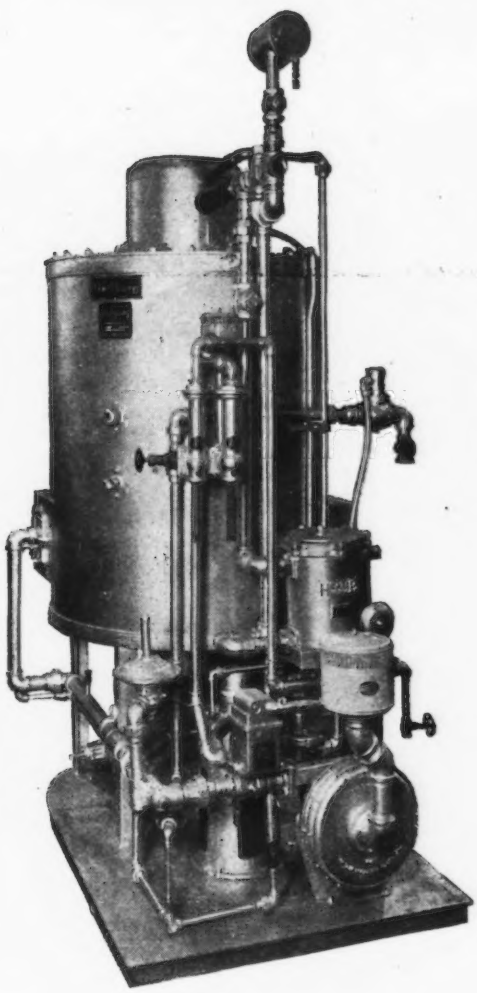
• **Stephen K. Jacobsen,** 50, president and business agent of the AFL Iron Workers Local No. 6, died Dec. 30 in Buffalo. He was a native of Copenhagen, Denmark.

• **Dr. Robert J. Moore,** 54, technical co-ordinator of Bakelite Corp., New York, a unit of Union Carbide & Carbon Corp., died Jan. 6. Dr. Moore was a member of the National Research Council since 1944 under which he served on the advisory committee on plastics and coatings to the Quartermaster Corps.

• **Charles F. Bliss,** 88, died Jan. 7 in New Haven, Conn. He was president of the Farrel Foundry & Machine Co. until 1927 when it became the Farrel-Birmingham Co. and served as president of that company until his retirement in 1928. He also was president of the Bridgeport Forge Co.

• **E. Kay Ford,** 57, vice-president of the Hanna Furnace Corp., Detroit, died recently. He joined the Hanna Furnace Corp., a unit of National Steel Corp., as a salesman in 1920, and became vice-president in charge of sales in 1929. He was a member of the American Iron & Steel Institute and the American Foundrymen's Assn.

For Carbon Restoration



THE *LINDBERG* HYEN HYDRYZING GENERATOR

Do you have the problem of *restoring carbon* to the surface of decarburized plate, rod, strip, or on parts where the mill bark has been removed? If so, investigate the possibilities of the Lindberg Hyen Hydryzing Generator.

By using Hyen atmosphere for *carbon restoration* you can eliminate costly time and material loss involved in machining or grinding operations necessary to get rid of decarburized surfaces (in cases where work has already been machined or finished, such as screws, tools, or dies, removing the surface is often out of the question, and carbon restoration is almost a must).

The Hyen is a *precision* generator, easily adjusted to be in equilibrium with *any* carbon steel. Once adjusted, it *stays adjusted.* This eliminates any possibility of restoring too much carbon, which of course would result in carburization.

A CENTRAL STATION GENERATOR

In cases where more than one furnace is being used for carbon restoration, the Hyen acts as a *central station generator,* supplying atmosphere to as many as 7 or 8 different furnaces.

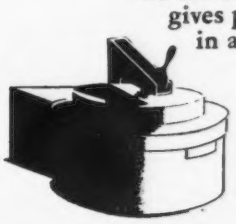
A MULTI-PURPOSE GENERATOR

The Hyen is actually a quintuple-threat generator. Not only is it ideal for carbon restoration, but it can also furnish atmospheres for hardening, brazing, and sintering, free from scale, carb, or decarb. Hyen atmosphere is excellent as a carrier gas for gas carburizing.

OPERATION FULLY AUTOMATIC

Light the pilot, and from then on every phase of the HYEN operation is automatically controlled through push-buttons. A new development in retorts—the refractory retort, permits the use of an extremely high cracking temperature. This gives precision cracking with no sooting or drifting in analysis.

Bulletin 190 "Lindberg Controlled Atmospheres" is available on request. Lindberg Engineering Company, 2452 West Hubbard, Chicago 12, Illinois.



LINDBERG FURNACES

Dear Editor:

BLACKALLOY

Sir:

We would like to call your attention to the fact that our product, Blackalloy, is not listed in THE IRON AGE Trade Name Directory in the issue of Jan. 2 . . . If you will refer to p. 14 of your Directory of Tool Steels, you will find our product listed. We would appreciate your including this information in the Trade Name Directory with one exception. On Jan. 1, 1947 our company name was changed to the Blackalloy Co. of America. Kindly use this name instead of the Black Eagle Co.

JACQUES M. HYMANS
Sales Manager
Black Alloy Co. of America
New York

● Your letter, Reader Hymans, brings up a point we'd like to clarify. Tool steels are not included in the general Trade Name Directory; they are covered separately by THE IRON AGE Tool Steel Directory. We are correcting your company name for the revised edition of the tool steel directory now in preparation.—Ed.

IRON PYRITES

Sir:

We are interested in securing a source of supply for iron pyrites in walnut size lumps. Our former supplier reports their stocks are exhausted and they are unable to supply us at this time. We shall very much appreciate any information you may be able to give us concerning possible sources of supply for this material.

J. S. McABEE
Purchasing Agent
J. T. Baker Chemical Co.
Phillipsburg, N. J.

● Probably the largest distributors of pyrites is the Pyrites Co., Wilmington, Del., who distribute Spanish pyrites of the Rio Tinto Co. and who may be able to take care of your requirements. Another possible source of the mineral is the Mountain Copper Co., San Francisco. We suggest you write to Mr. L. T. Kett, there.—Ed.

FORGING ROUNDS

Sir:

Kindly send one reprint of the article on "Forging High Alloy Rounds With V-Type Dies," in the Aug. 1 issue.

M. B. GRAHAM
Metallurgist
Boston Naval Shipyard
Boston

MUST READING

Sir:

The article in the Oct. 31 issue, entitled "So You're Designing a New Product," by George K. Hendrick strikes me as an enthusiasm brake which should be "under the glass" on the desk of any man who has even a nodding acquaintance with the development of new products. Mr. Hendrick certainly knows the sore spots in a development project and his analysis is so accurate that it makes a lot of us who are connected with the development end of a business feel like two cents (less income tax). If a reprint of this article has been made, I should like to have at least a half a dozen to plant in strategic spots, hoping it will help us to do better in the future.

E. W. KAMM
Bowser, Inc.
Fort Wayne, Ind.

DROSS VIBRATOR

Sir:

We have read in your magazine, some time ago, about a concern in Connecticut who manufactures some type of special tool or equipment for removing dross or salvaging the pure metal from the dross when drossing galvanizing kettles. We are anxious to contact this firm and are writing to inquire whether you can assist us in locating them.

ROBERT DREBEN
President
Ledkote Products Co.
Everett, Mass.

● Undoubtedly you have in mind the Brandford dross vibrator, manufactured by the New Haven Vibrator Co., New Haven, Conn. Or perhaps you might want to write to Mr. Wallace G. Imhoff, 905 So. Bedford St., Los Angeles 35, a consulting engineer on galvanizing who has prepared articles for us on that subject and is familiar with the equipment.—Ed.

PLANT LAYOUT

Sir:

I would appreciate your sending me, if available, a reprint of the article in the Dec. 19 issue entitled "Planning a Plant Layout" by Robert Spurgin, Jr.

STEVEN W. MEYER
Chief Draftsman
Rossi Continuous Casting Co.
New York

VASCO SUPREME

Sir:

We appreciate your interest in our new high speed steel Vasco Supreme to which you devoted p. 63 of the Dec. 12 issue. However, we wish to call your attention to an error which appears in the text. Referring to the seventh line, third paragraph, column two, the temperature should read 2300° F rather than 2200° F. It is, of course, always necessary that a controlled atmosphere furnace be operated at a higher temperature than either a semimuffle type furnace or a salt bath.

J. CLEVELAND McKENNA
Advertising Manager
Vanadium-Alloys Steel Co.
Latrobe, Pa.

X-RAY INSPECTION

Sir:

I would appreciate receiving tear sheets of the article entitled "The Case for 100 Pct X-ray Inspection of Aircraft Castings" by J. G. Schneeman, appearing in the Oct. 10 issue.

CYRUS A. POOLE
E. I. du Pont de Nemours & Co.
Wilmington 98, Del.

SINTERED RUBIES

Sir:

In your "Newsfront" of the Dec. 12 issue, you mentioned that a German scientist working with the Air Materiel Command has developed a sintered ruby material useful for dressing grinding wheels. Could you give me some further information on this invention and the scientist?

P. GRODZINSKI
Technical Consultant
Industrial Diamond Review
London

● Additional information on the sintered ruby material developed by Dr. Eugen Ryschkewitsch will be found in the tear sheets, which we are forwarding, of the article, "Army Reveals Research Activities of German Scientists in America" appearing in the same issue on p. 116B. Our suggestion for reaching Dr. Ryschkewitsch personally would be through the Director of Public Relations, Air Materiel Command, Wright Field, Dayton.—Ed.

MELTING RIMMED STEEL

Sir:

Please send us tear sheets of the very interesting article, "Melting Rimmed Steel in the Electric Arc Furnace," by E. S. Kopecki, associate editor, published in the Sept. 26 issue, pp. 62 to 65.

JOHN R. MACDONALD
Assistant Metallurgist
A. M. Byers Co.
Pittsburgh

SHOT PEENING

Sir:

We would appreciate receiving as many tear sheets as you can spare of the article, "Strengthening Metal Parts by Shot Peening" by H. F. Moore, which appeared in the Nov. 28 and Dec. 5 issues.

FRED K. LANDECKER
Manager
Metal Improvement Co.
Los Angeles

PERMANENT MAGNET STEELS

Sir:

We would appreciate receiving three copies of the article by W. E. Ruder, entitled "Permanent Magnet Steels," which appeared in the May 9 issue.

BENJAMIN FALK
Metallurgical Dept.
Simonds Saw & Steel Co.
Lockport, N. Y.

● The many requests for this article have depleted our supply of tear sheets from the May 9 issue. However, we have managed to find one set of tear sheets which we are glad to forward.—Ed.

PUT YOUR PRODUCTS in a *cleaning test tube*

When you bring your products to our demonstration laboratory we can show you exactly what type of cleaning machine is best suited to your cleaning problem and to the production volume you want to handle. Everything is here to give you the complete facts needed to compare your present practice, or any other cleaning method, with the results you can get with the world-famed airless Wheelabrator.

If you've been think about improving your cleaning practice and have been debating the pros and cons of various cleaning methods, here is a perfect opportunity to get positive facts. Hundreds of others like yourself have put the Wheelabrator to this test and it has proved, by convincing demonstration, why it is used in more plants than any other type of blast cleaning equipment. Let us arrange for such a test today.

WORLD'S LARGEST BUILDERS OF AIRLESS BLAST EQUIPMENT

American
WHEELABRATOR & EQUIPMENT CORP.
(FORMERLY AMERICAN FOUNDRY EQUIPMENT CO.)
510 S. Byrkit St., Mishawaka, Indiana

Industrial News Summary...

- ***Steel Negotiations Look Peaceful***
- ***Informal Contacts Have Been Made***
- ***Scrap Market Stronger in All Areas***

BARRING a most unusual reversal in the current attitude of steel management and labor, formal negotiations between union heads and U. S. Steel officials this week will be terminated on a mutually satisfactory basis by the time present contracts expire on Feb. 15. Through the medium of preliminary or "informal" contacts between management and labor representatives, major outlines for the negotiations have been settled and a definite course of action has been agreed upon.

All that remains for U. S. Steel representatives and USWA heads when they meet later this week is to get down to brass tacks, do a little shadowboxing for public consumption and determine how much each can give on the wage demand without losing its respective position in the eyes of the public, the stockholders and steel labor. It is believed that the postponement of the negotiations originally scheduled for last week between U. S. Steel Corp. and the union was in part due to the desire of both parties to study further their respective approaches on the question of portal-to-portal pay.

The Union expects that the suits already instituted will serve as a bargaining tool and by no means takes seriously the outlandish monetary figures which have been associated with the filing of the suits. Management, on the other hand, is anxious for a legal definition of what constitutes "walking time," as well as valid legislative action which it hopes will establish a clear-cut course for future action. Both sides hope that these questions will be definitely answered before steel wage negotiations are completed.

IN lieu of a militant and stubborn insistence on a substantial wage increase, the steel union is expected to place considerable emphasis on its social security package which has been laid on the table for management to scrutinize. Such demands as portal-to-portal pay provisions, increased retirement benefits and an annual wage formula may find themselves delegated to company-union commissions or committees, the duty of which will be to reach an amicable agreement after new wage contracts have been executed.

It seemed likely this week that after the smoke clears away from contract negotiations, the steel union will have obtained some definite setup on a health and welfare program, which will involve group insurance, hospitalization and medical and surgical aid. Whether or not steel firms will agree to foot the entire bill is another matter and one which will require rugged negotiations.

Indicating the speed with which the steel industry hopes to pare down some of its unwieldy order backlog, the ingot rate this week advanced to a new postwar high of 92 pct of capacity, up half a point from last week. If this level could be maintained throughout the year, ingot output on an annual basis would approximate 84 million tons. If such a rate is approached for no more than 4 to 6 months almost all of the unusual tightness in steel supplies will disappear and the supply and demand situation would take on a normal appearance.

POSSIBLY reflecting the optimism over the labor outlook and the subsequent chance for uninterrupted steel production, the scrap market has again exhibited a strong tendency with higher quotations already appearing in the Cleveland area. At midweek fresh buying in some of the other areas had dried up and brokers were finding difficulty in covering at the current quotations. Further clarification of market prices is expected sometime later this week.

Many steel firms in an effort to eliminate overtime and yet maintain operations at as high a level as possible are finding themselves short of both skilled and unskilled labor. Some companies have failed in their efforts to bring in workers from remote areas because of the housing shortage. The shortage of some types of steel labor, however, is not considered to be as serious as it was a year ago.

STEEL firms this week report no easing in the volume of inquiries from their customers. Practically any mill which wished to let the bars down and accept as many orders as were presented could fill its books throughout the entire year and in some instances into 1948. However, practically no mills are willing to commit themselves on third quarter tonnage. Present records show that the quotas granted for the first two quarters may not be met since shipments during the past month have been lower in volume than had been planned.

It was pointed out in some quarters, however, that a whittling down of the unfilled tonnage volume would find a better relationship between steel companies and their customers with the result that both steel ordering and shipments would be on a less hectic basis. Although the steel consuming groups as a whole have not been very vocal about the base price increases, there has been some muttering over the revised steel extra charges. The latter, however, are being rapidly explained by steel firms as being a realistic approach to a problem which should have been settled years ago in order to effect charges on a proper basis.

There has been little change in the expanding foreign demand for American steel. After mill prices pass through brokers and other agencies who supply foreign buyers, final prices at times are strangely reminiscent of a highly speculative market. This condition is expected to continue until export demand has dropped somewhat from its present level.

• **MORE ORE BENEFICIATION**—U. S. Steel's Oliver Iron Mining Co., will spend $34,000,000 on iron ore beneficiation during the next 6 years. The program includes 4 additional beneficiation plants at various points in the Mesabi range, and additional facilities at the company's Duluth research laboratory. The program covers the use of marginal and high silica ores, fine ores now lost in tailings and research on magnetic and non-magnetic taconites, which will be a continuation of work done at Battelle Memorial Institute.

• **NEW TINMILL BASE**—The Republic Steel Corp. has established Warren, Ohio, as a basing point for coke and electrolytic tinplate and blackplate effective Jan. 1. No price differential has been established between the Pittsburgh and Warren bases.

• **SILICON EXTRA CLARIFIED**—The widespread confusion concerning the assessment of the silicon extra on hot-rolled carbon bars, included in the recent list of new extra prices, has been clarified. The Carnegie-Illinois Steel Corp. has decided that certain features govern the extra and they will supply only killed steel under the following conditions. All rounds, squares and hexagons 3 in. in diam or greater, or of equivalent cross section plus flats in 12 sq in. in cross section or greater will only be sold as killed steel. Any steel specifying a carbon content exceeding 0.65 max is in the same category. Steels to be quenched or carburized and all fine grain steels must be ordered with a minimum or maximum range over the 0.10 silicon min, which means it must be a fully killed steel. Generally, any steel used for forgings with a carbon content of 0.15 min or greater must be specified as killed. With the above exceptions, the question of when the extra applies conforms to the original outline of the new price card.

• **PHILIPPINE TRADE**—In order to expedite the flow of trade from the United States to the Philippines, certificates of origin may be sworn to before a notary public, the Philippine Embassy announces. Formerly it was necessary to affirm such certificates before a collector or deputy collector of customs.

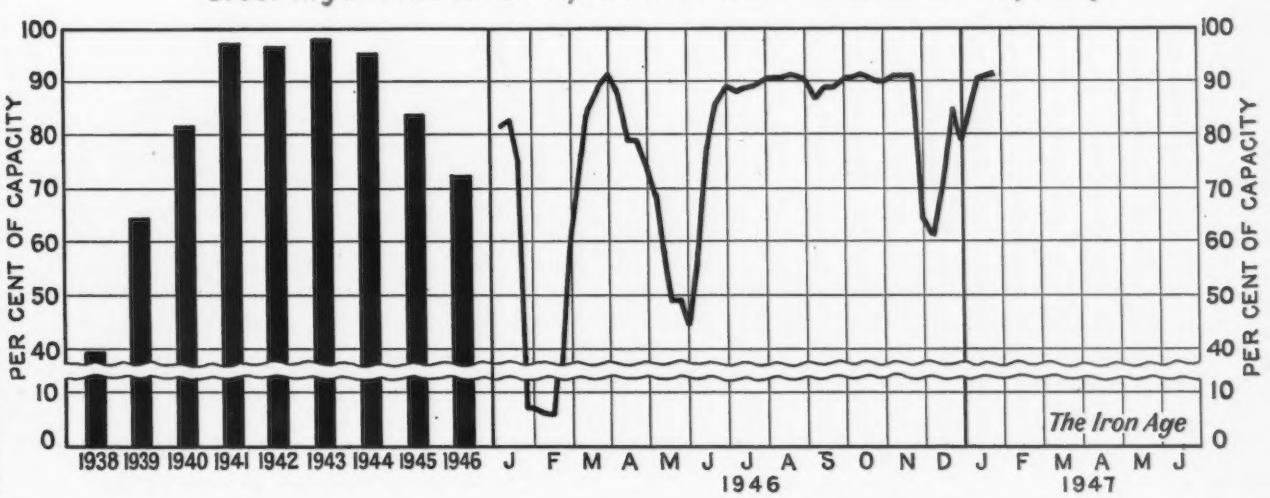
• **EXPORT ALUMINUM SHEETS CONTROLLED**—Aluminum sheets, plates and strips have been placed under export control by the Office of International Trade, Dept. of Commerce, effective Jan. 22. The action was taken at the request of the National Housing Expediter in order to conserve available supplies to meet the demands of the emergency housing program.

• **FRENCH STEEL PRICES STATIC** — Considerable confusion at the price level in the French steel industry has resulted from an early announcement of a 30 pct increase in pig iron prices and a 20 pct increase in steel prices, both to come into effect as of Jan. 1. Then the effort of the Blum government to change the tide of inflation in France resulted in an almost immediate 5 pct cut in all prices, followed by another special cut in iron and steel products which sent them back to their Dec. 31 levels. The original plan was to eliminate the subsidies which the government has been paying to steel producers simultaneously with the price increase, but it seems likely now that the subsidies will be retained.

• **BRITISH STEEL OUTPUT**—Steel production in the United Kingdom during 1946 totaled 14,216,000 tons, compared with 13,242,000 tons in 1945 and 11,644,000 tons in 1938. The pig iron output in 1946 totaled 8,692,000 tons, compared with 7,959,000 tons in 1945 and 7,572,000 tons in 1938. Steel production during December last amounted to 1,058,600 tons, and pig iron to 685,300 tons.

• **HOUSEHOLD APPLIANCE OUTLOOK**—Increased production and shipment of household appliances and home heating units has been forecast by CPA after preliminary figures indicated that January output of fractional horsepower electric motors would be around 2½ million units. Slightly more than half the total will be suitable for use of appliances and furnaces. Officials said that while priority users of the type of motors used for heating units would require better than 90 pct of estimated production during the first quarter of 1947, all furnace producers are receiving an equitable share of the motor output.

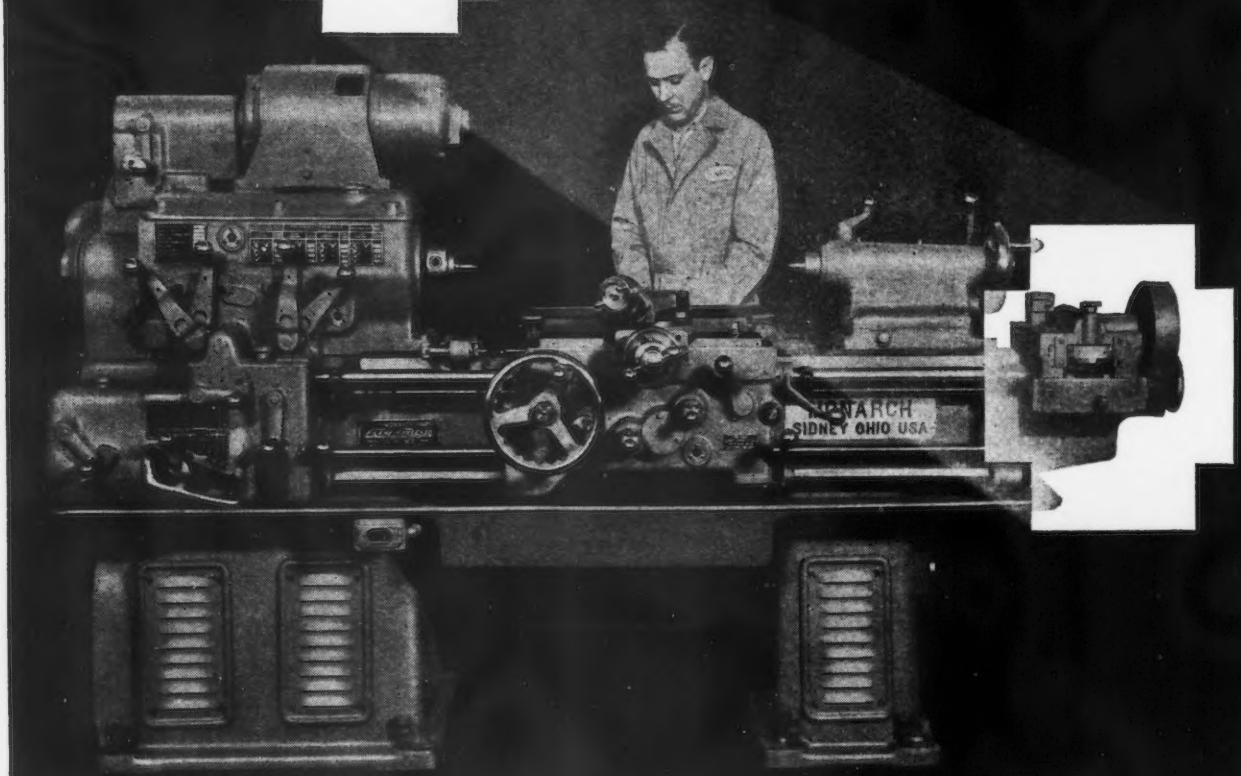
Steel Ingot Production by Districts and Per Cent of Capacity



Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	Cleveland	Buffalo	Wheeling	South	Detroit	West	Ohio River	St. Louis	East	Aggregate
January 14.....	101.0	90.5	90.5*	94.0	98.5*	102.0	98.0	99.0	102.5	82.0	102.0	81.0	76.0	91.5
January 21.....	101.0	90.5	89.0	94.0	96.0	102.0	98.0	99.0	98.5	89.0	94.0	66.0	86.0	92.0

* Revised.

NOW A MOLDMAKER'S TOOLROOM LATHE WITH A *PLUS* FOR PLASTICS MOLDMAKERS



A complete range of lead variations—you can set your machine for any one of them in exactly one and one-half minutes!

Compare that performance with a normal toolroom lathe's—and change gears requiring thirty minutes to change. Think what you'll save on production time—and on original investment in change gears, too—especially if any sizable share of your production is thread molds for plastics.

Principal among the patented features of this new Monarch moldmaker's toolroom lathe is the adjustable leadscrew variating mechanism—a device that makes it a simple matter to compensate for the shrinkage of the material to be molded. Plastic thread molds become a mere routine production operation.

Then there's a speed-reducer—that permits slowing down to a *fraction of a revolution a minute* for internal and external milling operations, performed at a single setting of the mold in the lathe.

Add to these the features built into every Monarch toolroom lathe (and the machine is equally adaptable for normal toolroom work)—features that have a proved record for precision and long life. The result is a machine you can't afford to be without if you have any plastics production. Like more facts? Ask for specification sheet 405—or call your nearest Monarch representative.

ACCURACY · ECONOMY · LONG LIFE
Monarch
TURNING MACHINES

THE MONARCH MACHINE TOOL CO. · SIDNEY, OHIO

Steel Labor Talks Force Contract "Holiday" on Fabricators

Pittsburgh

• • • While the United Steelworkers of America and the steel industry have started their sparring match preparatory to the main contract bout, the union is forcing a contract "holiday" on the fabricators. In other words, fabricators' contracts will not be discussed until such time as the steel industry's contract is settled.

Despite some loud statements to the contrary, there seems little doubt that the vast steel fabricating industry of this country will go along with the contract that is finally negotiated with the steel producing industry. About 1400 fabricators' agreements expire on Feb. 15, and they will closely adhere to the final steel contracts, it is believed here.

The fabricator again is squeezed in the vise of increased wages and increased steel prices.

Despite Their Middle Position Processors May Have To Meet New Steel Wages

o o o

By T. E. LLOYD
Pittsburgh Regional Editor

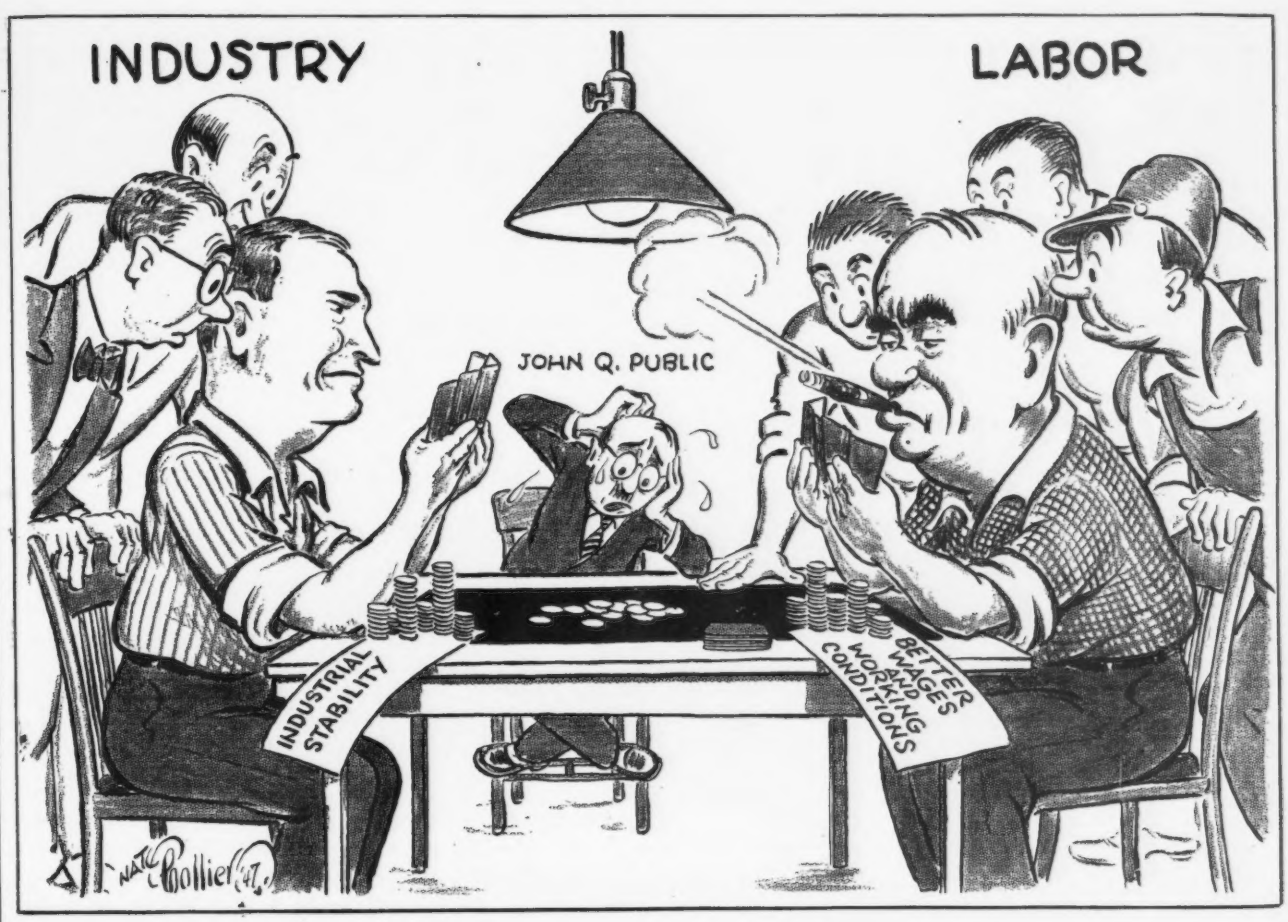
o o o

However, this time there is more likelihood that the increased costs will be passed along to the consumer, since price controls are off and the only governing factor on prices of the fabricators' products will be salability. While there are indications of a tightening of the nation's purse strings, the steel fabricating industry may well find that its products are in sufficient demand to overcome any such trends.

In any event, the fabricator's lot is not a happy nor an easy one. He is definitely faced with cost increases over which he has no control, and he knows just as definitely that he is in danger of pricing himself out of the market. Compared to the steel industry, the fabricator generally is small business without the tremendous resources of the steel producer.

This, claims the fabricator, is reason enough for a separate and distinct contract based not on the steel industry but solely on the steel fabricators. The union sees the danger in this, however, since it would mean just a duplication of geographical pay differentials with the only difference being the industry in which a man works. The job might be identical, but the steel industry would have a higher pay rate than the fabricating industry.

Big Stakes!



Premium Payments For Nail Production Likely To Be Dropped Mar. 31

Washington

• • • **Premium payments** for wire nail production are not likely to be continued beyond the scheduled expiration date of March 31, according to sources within NHA. An official decision will not be announced until after a final review of the situation is made and further consultation with the industry.

Present indications are that continued bonus payments through March will maintain monthly output at the 77,000 ton level or better, thus requiring an average production of only 71,000 tons a month for the remainder of the year in order to meet estimated 1947 requirements of 866,000 tons.

Production goals of 77,000 tons monthly were set for the industry when the NHA premium payment plan became effective last October. Output rose from 63,000 tons in September to 75,000 tons in November with preliminary reports indicating that the 77,000 figure had been attained by the end of 1946.

At a recent meeting of the CPA steel industry advisory committee, the group went on record as opposing premiums of any kind but conceded that bonuses for nails should be continued through March because of probable commitments under the plan.

New Program Calls For The Production of 7000 Freight Cars a Month

Washington

• • • **A production goal** of 7000 freight cars a month was announced by CPA after a meeting with the Freight Car Builders Industry Advisory Committee on Jan. 16. The new program, calling for voluntary cooperation between car builders and component suppliers, would mean doubling the current production rate of about 3500 cars monthly.

Production may reach 4000 per month in April, the committee said, and could rise to 9000 cars monthly in July if additional materials were made available. ODT's program which called for 10,000 cars a month was rejected as impossible of attainment.

Since CPA's priorities powers expire on Mar. 31, 1947, the accelerated program must be on a voluntary basis, CPA said. The agency's part in the program is merely to produce a blueprint from which producers and suppliers can operate.

CPA has, however, exercised its priority powers to help car builders obtain surplus materials. Directives will be issued by CPA for the purchase of surplus stocks. Such directives are binding on WAA.

The committee unanimously approved the appointment of a task group to work with CPA on procurement of materials for freight cars.

A similar group has been named by the steel industry to work on steel supplies for car builders.

Steel supplies are the basic problem for car building, members agreed, but they said that some assistance might be required to obtain sufficient plywood and other lumber.

Committee members will submit bills of materials to CPA on all components needed for car production in the March-June period.

Battle of Statistics

New York

• • • **The Nathan Report, the CIO-backed plan for a national wage policy for 1947, has come under the fire of two more economists. Adding their weight to the statistical contradiction advanced by the National Association of Manufacturers were replies by the American Federation of Labor and the American Iron & Steel Institute, both stressing the fact that overall industrial profits could not be applied to specific companies. However, it is expected here that publication of a report which Robert Nathan has prepared specifically on the steel industry will be the signal for a new batch of statistical analyses designed to prove the fallacy of the Nathan theory. One industrialist remarked that perhaps Mr. Nathan could be hired to build a perpetual motion machine.**

Portsmouth Steel Corp. Plans for an Expansion Of Wire Department

Portsmouth, Ohio

• • • **Plans for a major** expansion program in the wire department of Portsmouth Steel Corp. for the production of fine and specialty wires have been announced by Elmer A. Schwartz, Portsmouth president.

He said Portsmouth was working on specification and within a few weeks hopes to announce detailed plans. New products proposed for production include oil tempered spring wire for use in automobile and mechanical equipment, and industrial cloth, etc.

As a prelude to the expansion program, Herbert H. Snowden, formerly works manager of Seneca Wire & Mfg. Co., Fostoria, Ohio, has been named assistant general superintendent of the rod and wire mill department of Portsmouth Steel Corp.

"The mill is now producing merchant and market wire and we will expand to produce spring wire. Steel produced in the mill here can be used in the new wire products. We plan to improve the rod mill by enlarging the heating furnace and installing two additional reels, thereby increasing production about 50 pct," Mr. Snowden said.

The engineering and preparatory work for these changes requires considerable time, but the actual changeover can be accomplished in a few days without seriously interrupting production, Mr. Snowden said.

Present wire department equipment includes 203 wire drawing blocks (155 single, 48 continuous) drawing wire from ½ to 19 gage; (155 wire nail machines; three wire staple machines; 26 barbed wire machines;) 12 wire fence machines; seven bale tie machines and two galvanizing units. Chief products now made in the mill are barbed and fence wire, road mesh and nails.

In addition to increasing pickling, annealing and drawing capacity, another fence machine and a new galvanizing line will be installed. As a result of the expansion program, production of the rod and wire mill department will be increased from 13,000 to 22,000 tons a month.

Industrialists Urge Legislation Restricting Portal Pay Suits

Washington

• • • **Prompt enactment** of remedial legislation along the lines of the Capehart and Wiley bills which would drastically restrict portal-to-portal pay suits has been urged by industrialists appearing before a Senate Judiciary subcommittee. Such suits, it was held, are being used to pervert the Labor Act from an instrument for preventing sweatshop conditions to one which would destroy industry itself.

It has been estimated for the subcommittee that suits entered against the steel industry as a whole have now exceeded the $1 billion mark. This, it was stated, is considerably more than the amount of cash the industry has on hand and in the banks.

"At the end of 1945," declared Charles R. Hook, president of American Rolling Mill, "the cash position of the combined industry was less than $700 million; $1 billion is a larger amount than the net earnings of the entire industry for the 5-year period 1942 to 1946, inclusive."

The subcommittee was also told that aside from monetary considerations, if the suits were upheld the effect would be to threaten the security of the nation by completely destroying the aircraft industry. This industry is particularly vulnerable because of its sharp contraction of operations following the end of the war.

Mr. Hook told the subcommittee that suits now entered against four of American Rolling Mill's eight companies amounted to more than $20 million. At the same time, Thomas F. Patton, counsel for the Republic Steel Corp., said that suits filed against Republic and its subsidiaries by steel worker unions totaled more than $60 million.

Claims against 12 of the largest aircraft companies represent a potential $461 million, according to E. E. Wilson, former United Aircraft official and now chairman of the Board of Aircraft Industries Assn. This he added, is more than their combined net worth which he roughly estimated at about $423 million. The profit rate, he said, had dropped to 1 pct of sales.

Declare Steel Suits Larger Than Industry Earnings For 5-Year Period

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Employment of American Rolling Mill was given at about 20,000; Republic, at 60,000. The aircraft industry, as a whole, now employs an estimated 200,000 as against a wartime peak of 2,000,000 including workers on subcontracts.

In addition to the broader aspects of the matter, if the suits were upheld and allowed to continue, attention of the committee was called to some of the less obvious ramifications and effects of the suits.

It was emphasized that the impact of such action does not stop with the steel, aircraft, automotive and other industries as a whole. A major portion of the billions of hours devoted to wartime contracts was accumulated in the plants of subcontractors and small firms. To cite a specific example, it is estimated that more than 12,000 subcontractors, most of whom were subject to provisions of the Labor Act, were engaged on Army Air Forces contracts alone.

Obviously, if claims against large corporations are recognized and allowed, these small businesses and subcontractors automatically become liable as well. Thousands of small concerns would face staggering liabilities which they, even more than large corporations, are in no financial position to meet.

Furthermore, a number of plants owned by the government were operated by industry on a nonprofit, nonloss basis. Portal-to-portal claims against these would constitute a direct claim against the government. So, presumably, would claims against firms operating on a cost-plus fixed-fee basis.

While this would tend to lighten the overall burden on industry, it would knock out current economy objectives of the government. Presumably, the Office of Contract Settlement and possibly other agencies would have to be revived and wartime income tax returns reopened.

Bills by Senators Capehart (R-Ind.) and Wiley (R-Wis.) are before the subcommittee for consideration. These were endorsed in general by industrialists or their representatives who have appeared before the committee and who have asked legislation along the following lines:

Clearly defining "work" and "work week" to give them historical or "customary" meanings;

Relieving employers from liability in any action, present or future, for failure to pay for activities not usually considered work unless they had specifically agreed to pay for them;

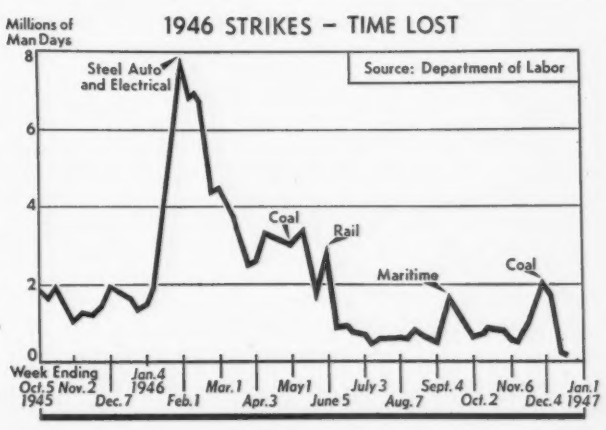
Relieving employers similarly for acts performed in good faith, relying on Wage-Hour Act rulings;

Authorizing compromises of claims under the Act;

Authorizing the courts to award discretionary (rather than mandatory) damages when it finds that the employer did not act in good faith; and

Placing a short-term limitation on starting actions to enforce claims under the Act.

PRETTY AS A PICTURE: *Dept. of Labor data disclosed Jan. 6 placed the national strike picture at its lowest point since VJ-Day. Note that the* 1946 *trend was down, following the crippling spring strikes. Many in the steel industry and steel union believe that a steel strike won't upset the* 1947 *graph.*



Vanadium Alloys Announces New Tool Steel Base and Extra Price List

Latrobe, Pa.

• • • New base and extra prices for tool steels have been announced by the Vanadium Alloys Steel Co., effective Apr. 1. The new prices will not require the calculation of the OPA—granted 8.2 pct increase on base price and extras as these prices incorporate that increase. New base prices, per pound, are as follows:

HIGH SPEED TOOL STEELS

	Base Price per pound
Subject to standard high speed steel extras	
18-4-1	$0.74
18-4-2	.85
18-4-1 5% cobalt	1.21
18-4-2 8% cobalt	1.45
20-4-2 12% cobalt	2.42
High-carbon tungsten cobalt 5% vanadium	1.50
6-6-2	.63
6-6-2	.63
6-6 with 4% vanadium	.80
Momax	.59
Molybdenum-vanadium	.59
Tungsten hot work die steel with nickel	.80
12% chrome—12% tungsten hot work die steel	.70
Low-carbon—14% tungsten hot work die steel	$0.61
Medium-carbon — 14% tungsten hot work die steel	.61
9% tungsten hot work die steels	.56
High-carbon — high-chrome die steel—oil hardening	.47
High-carbon — high-chrome die steel—air hardening	.47

CARBON TOOL STEELS

Subject to standard carbon tool steel extras	
Best quality carbon vanadium	$0.255
Best quality carbon	.24
Extra quality carbon vanadium	.215
Extra quality carbon	.20
Standard quality carbon vanadium	.175
Standard quality carbon	.16
Carbon tool steel with ½% vanadium	.26
Oil-hardening manganese	.26
5% chrome air-hardening die steel	.26
Silico-manganese water-hardening	.16
Silica-manganese — oil-hardening	.16
Tungsten shock resisting	.30
Low-tungsten die steel	.26
5% chrome hot work die steel	.26
1% carbon—4% chrome hot work die steel	.26
Chrome vanadium	.26
Chrome nickel molybdenum	.16
Molybdenum tool & die steel	.18
Chrome tool and die steel	.155

Problem of Materials Handling Cost Attacked At Cleveland Meeting

Cleveland

• • • A mass attack on the problem of materials handling costs was made at the first conference on materials handling, which was held concurrently with the National Materials Handling Exposition in the Cleveland Public Auditorium, Jan. 14 to 17 inclusive.

Jointly sponsored by the Assn. of Lift Trucks and Portable Elevators, Caster and Floor Truck Manufacturers' Assn., the Electric Industrial Truck Assn., and the Materials Handling Institute, the event attracted some 5000 out-of-town guests. American Warehousemen's Assn. cooperated with the sponsors in holding the event.

About 125 makers of materials handling equipment displayed their products at the exposition, which had as one of its features a materials handling theater, located adjacent to the lower exhibit hall, where continuous showings of outstanding materials handling films were presented.

Charles M. White, president, Republic Steel Corp., was the main speaker at the dinner session Wednesday night, Jan. 15. His subject was, "Industries' Hidden Cost —Materials Handling."

Members of the program committee for the conference and exposition included the following: Chairman, E. W. Clark, Clark Equipment Co., Battle Creek, Mich.; vice-chairman, Earl I. Burke, Republic Steel Corp., Cleveland and E. F. Twyman, Automatic Transportation Co., Chicago; Gordon J. Berry, vice-president, Electric Products Co., Cleveland; Norman L. Cahners, president, Materials Handling Laboratories, Boston; H. S. Germond, Jr., treasurer, Revolvator Co., North Bergen, N. J.; Edwin J. Heimer, president, Barrett-Cravens Co., Chicago; Clem D. Johnson, Roanoke Public Warehouses, Roanoke, Va.; C. F. Kells, director of education, Electric Industrial Truck Assn., Pittsburgh; A. L. Lewis, president, Lewis-Shepard Products, Inc., Watertown, Mass.; E. W. McDonald, president, Economy Engineering Co., Chicago; Ralph D. Mount, The Bassick Co., Bridgeport, Conn.; J. F. Thomas, president, Thomas Truck & Caster Co., Keokuk, Iowa, and Howard R. Waterbury, Assn. of Lift Trucks & Portable Elevators, Stamford, Conn.

Allocates Pig Iron For Housing, Brake Shoes

Washington

• • • Certified orders for merchant pig iron for housing items and railroad brake shoes will account for 150,000 tons of estimated February output of 369,000 tons. The February allocation was determined by CPA at a meeting with pig iron producers last week. The 150,000 ton maximum was opposed by NHA, since the housing industry and producers of railroad brake shoes had requested certifications totaling 229,000 tons for the coming month. A large reserve from the February allocation will be set aside for soil and pressure pipe.

The meeting was also told that shortages of merchant pig iron the greatest in eastern Pennsylvania and the southern states. CPA was scheduled to meet with the pig iron makers on Jan. 23 to discuss extension of the premium payment plan beyond the first quarter.

Awarded Pipe Contract

Los Angeles

• • • Consolidated Steel Corp. has been awarded a contract for the fabrication of approximately 100 miles of 26-in. outside diameter welded steel pipe by the El Paso Natural Gas Co. This contract, exceeding $2,500,000 is to be completed during 1947.

This is the second section of a $70 million, 1200-mile long, high pressure gas pipe line being installed between California and Texas to be awarded to this company. This 100-mile section will be laid east of the Colorado River. The previous contract, negotiated in September 1946, was for $6 million between the Southern California Gas Co. and the Southern Counties Gas Co. and Consolidated for 214 miles of 30-in. pipe between the Arizona-California border and Santa Fe Springs, California.

Weekly Gallup Polls . . .

Pressure for Higher Pay Found Widespread Among Labor

Princeton, N. J.

• • • **Because of the rise** in the cost of living there is at present widespread pressure among manual workers in general, and labor union members in particular, for pay boosts, according to George Gallup.

Half of the manual worker group, and about six out of every ten union members polled by the institute, say they think factory workers should have another round of wage increases.

Moreover, the CIO - endorsed theory that pay boosts can be granted without increasing prices has apparently taken hold in the minds of millions of Americans.

A substantial majority with opinions accept the idea that management can hand out another round of wage boosts without raising prices, the poll shows.

The significance of this belief is underlined by the fact that those who think wages can go up without increasing prices are far more in favor of increases in wages now than are those who feel that wages and prices must go up together.

However, management can find comfort in the fact that the average worker's idea of a fair wage increase is considerably less than the amount which such CIO leaders as Walter Reuther demanded at the time of the first postwar round of wage increases a year ago. The auto workers just a year ago were out on strike for a 30 pct boost in hourly wages.

Today the typical American worker throughout the country who has an opinion on the issue thinks a 10 pct wage increase for factory workers would be about right.

The latest probe of public sentiment on the wage-price front was conducted by the institute on a number of issues, as follows:

(1) "Many unions of factory workers are going to ask for a pay increase within the next month or two. Do you think these factory workers should get more pay?"

The vote by occupational groups and for the nation as a whole is shown below.

	Yes Pct	No Pct	No op. Pct
Farmers	19	71	10
Prof. & Bus.	31	56	13
White Collar	37	48	15
Manual Workers	50	37	13
Union members only	59	30	11
Total U. S. A.	38	49	13

The vote on the question is broken down here to show how thinking splits among those who think prices and wages must go up together and among those who think wages can be boosted without increasing prices:

	Favor Wage Increase Pct	Oppose Wage Increase Pct	Undec. Pct
Those who think prices must rise if wages do	21	68	11
Those who think wages can be increased without affecting prices	57	32	11

The next question dealt with an issue raised by Robert Nathan, CIO economist, in his recent report on wages and prices.

(2) "Do you think pay increases could be given by most factories without increasing the prices of the goods they make?"

The national vote:

	Pct
Yes	47
No	40
No opinion	13

In the manual worker group the affirmative vote was especially high—55 pct said "yes," while only 30 voted "no" and 15 pct expressed no opinion.

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• • • **One of the least** understood major laws of the land is the Wagner Labor Act.

Only about one-fifth of the adult population has any idea what this basic piece of legislation, which defines collective bargaining rights and processes of labor unions, is all about.

The law has been on the statute books since 1935 and has been a major instrument in fostering and developing the growth of unions during the past decade.

Few Understand Wagner Labor Act; British Lack of Desire to Work Due Partly to Tax Rate

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There has been much talk in the new Congress about revising the Wagner Act. In order to find out what the general voting population thinks of the controversy, the institute conducted a survey from coast to coast on several aspects of the Wagner Act, which is also known as the National Labor Relations Act.

First it put this question to the voters:

"What is your understanding of what the Wagner Labor Act provides—or is supposed to do?"

It may come as a surprise to Congressmen, business leaders and labor leaders how few people, comparatively speaking, are familiar with even the main essentials of the act over which there is so much dispute.

Nineteen percent of all voters interviewed were able to indicate that they have at least a general idea of what the act is, while 12 pct gave a totally incorrect answer, and 69 pct said they simply do not know what the Wagner Act is.

Among the few who are familiar with the act, there is overwhelming sentiment in favor of amending it.

Approximately two out of three expressing an opinion on the point said they thought the act should be either changed or repealed, while only one-third voted to leave it on the statute books unchanged.

Those who want it revised say that it is too one-sided now in favor of labor, that it ought to be amended to treat management and labor on a more equal basis.

Among its many provisions the

(CONTINUED ON PAGE 144)

To Build Pilot Plant for Exploitation of Low-Grade Iron Ore

Plant Will Treat 1800 Tons A Day; Ore Stocks Now At Peacetime Peak

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Cleveland

• • • **A significant step toward** assuring iron ore supplies in the future for the steel industry in America has been taken by Erie Mining Co., managed by Pickands, Mather & Co. here, with the announcement that Erie Mining Co. is planning to proceed with the construction during 1947 of a preliminary pilot plant for the concentration of taconite on the Mesabi Range in Minnesota.

The raw material to be treated will be the unaltered iron formation containing approximately 30 pct iron, which will be mined by open pit methods.

The proposed plant will be designed to treat approximately 1800 long tons of material per 24-hr day, which will involve an annual production of finished concentrate of around 175,000 to 200,000 tons per year if the plant is operated continuously, and the mining of up to 600,000 tons of crude taconite per year. The plant will be ready for operation sometime during 1948.

The plant will be designed to simulate as far as possible what will happen in a large commercial plant and to give information and experience which will be helpful in solving the problems and economics of a commercial operation.

Except for the fact that primary crushers will not be installed, the equipment will generally be of the same size and character as contemplated for a full sized commercial plant. Roughly, the contemplated process of flow sheet will comprise haulage of the crude taconite material by truck to the crushing plant after drilling and blasting.

The plant itself will involve three-stage crushing, grinding equipment consisting of rod mills and ball mills; classifiers, magnetic separators; filtering plant, mixing plant and facilities for agglomerating the finely ground product.

Erie Mining Co. has been carrying on small scale laboratory tests of various methods of taconite concentration over a period of years.

Whether Erie Mining Co.'s move will lead ultimately to the construction of large taconite concentration plants on the Mesabi is yet to be determined, but both Erie Mining Co. and Pickands, Mather & Co. will be in a better position to judge after 1948, it was said here.

Independent experts pointed out some time ago that construction of large taconite concentration plants on the Mesabi will mean that the range will actually become a manufacturing district rather than a straight mining district, since the taconite industry will actually manufacture high grade iron ore from worthless rock.

This fact has already been recognized by the state of Minnesota, which has modified its tax laws so that the total tax paid by the taconite industry will amount to only about 6¢ per ton of shipping product, compared with an average tax on iron ore now being shipped of about 43¢ per ton of product shipped.

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Cleveland

• • • **Third highest iron ore** tonnage for any peacetime season was piled up by the Great Lakes bulk cargo fleet at lower-lake railheads and blast furnaces in 1946, as the fleet moved the greatest tonnage in its peacetime history supplying basic industries with 147,955,458 net tons of iron ore, coal, grain and limestone.

According to the official tabulation of all lake-borne cargoes in this category, compiled by the Lake Carriers' Assn., 66,479,522 net tons of iron ore were moved to lower lake ports, despite loss of a full month at the beginning of the 8-month season brought on by strikes in the coal and iron mines.

Compared with the crucial war year of 1945, the Lake Carriers' figures showed last year's movement of 66,479,522 tons, totaled 18⅓ million tons less of the ore on which America's steel-making industry depends for all but a seventh of its annual supply.

Coal, of which the fleet moves an annual average of one in every 10 tons brought out of bituminous mines in the United States was not available in volume until June.

Tabulation of cargo tonnages for last year in net tons, as compared with the preceding war year, follows:

	1946	1945
Iron Ore	66,479,522	84,800,520
Bituminous Coal	52,361,722	53,670,837
Anthracite	1,364,809	1,575,360
Grain	10,197,850	18,717,773
Limestone	17,551,555	16,318,193
Total	147,955,458	175,082,683

Limestone cargoes, normally paced by the down-lakes flow of iron ore with which the stone is essential as a flux in blast furnaces, hung up a new peacetime record. The total of 17,551,555 tons was, in fact, greater than for any of the war years except 1941 and 1942.

AT THE POST—*Six of the new 6000 hp F-3, wide range locomotives built by Electro-Motive Division of GMC, are now in operation on the Santa Fe System. The latest addition brings the total Santa Fe diesel fleet to* 518 *units,* 388 *of which have been supplied by General Motors.*

Justice Dept. Files Suit Against Phillips Screw Manufacturers

Washington

• • • **Attorney General** Tom C. Clark has announced the filing in the U. S. District Court at Chicago of a civil action charging price fixing, patent pooling, cartels and other restraints of trade against a patent-holding company, nine screw manufacturers and eight screw driver and bit manufacturers, in the manufacture and sale of cross recessed head screws and tools used in connection with the screws.

The complaint names the Phillips Screw Co., Portland, Ore., as the patent-holding company and the following nine screw manufacturing companies: American Screw Co., Providence; American Hardware Corp., New Britain, Conn.; Continental Screw Co., New Bedford, Mass.; Illinois Tool Works, Chicago; The National Screw & Mfg. Co., Cleveland; Parker-Kalon Corp., New York; Pheoll Manufacturing Co., Chicago; Russell, Birdsall Co., Port Chester, N. Y.; and Scovill Mfg. Co., Waterbury, Conn.

The eight screw driver and bit manufacturers named are listed as follows:

The Apex Machine Tool Co., Dayton, Ohio; The Black and Decker Mfg. Co., Towson, Md.; The Bridgeport Hardware Mfg. Corp., Bridgeport, Conn.; Independent Pneumatic Tool Co., Chicago; North Brothers Mfg. Co., Philadelphia; Parker Mfg. Co., Worcester, Mass.; The Stanley Works, New Britain, Conn.; and The Vlchek Tool Co., Cleveland.

The complaint charges the defendants with using patent licenses on cross recessed head screws and screw drivers for use with such screws to cloak a price-fixing scheme by means of which identical prices were fixed on the sale and resale of such screws and drivers. The complaint also charges that the defendants set up a cartel arrangement and that the domestic licensees agreed not to sell the screws, commonly known as "Phillips" screws, or screw drivers outside the United States, while foreign licensees agreed not to ship the screws or drivers into the United States. The foreign licensees listed are Guest, Keen and Nettlefolds of Birmingham, England, and J. Osawa & Co., Ltd., of Kyoto, Japan.

The complaint also alleges that the defendants agree not to manufacture any type of screws which would compete with "Phillips" screws.

The suit asks that all alleged illegal arrangements be cancelled, and that all licenses under the "Phillips" screw and screw driver patents be declared illegal, and that the Court order such relief with respect to the patents as will dissipate the effects of their alleged unlawful use. The complaint also asks that the defendants be enjoined from entering into any arrangement that sets fixed sale or resale prices or conditions of sale on "Phillips" screws and drivers.

Steel Warehouses Now Computing New Prices

Pittsburgh

• • • **Prices on warehouse** steels are not yet uniformly established in this area but another week should see completed lists by warehouses made public. Individual warehousemen express concern at the increases made necessary by the increase in mill prices.

At least one warehouse will sell certain flat-rolled items, hot-rolled sheet and strip and cold-rolled sheet, on the basis of a markup from the mill price. This markup will be the mill price, plus mill extras, plus a warehouse differential, establishing the country price. To the country price is added another 10¢ a cwt to determine the city price.

For example, on hot-rolled sheets, the price will be computed at $2.50 a cwt (the mill base) plus the mill extras, plus 45 pct. Thus, no set price can be established on this commodity since the individual order will determine the mill extras. On cold-rolled sheet, with a mill base of $3.20 a cwt, mill extras and a 40 pct warehouse extra will make the country price. To this is added 10¢ a cwt for the city price.

Hot-rolled and cold finished bars came in for some heavy price increases. Hot-rolled bars, Pittsburgh, were boosted from a city price of $3.60 a cwt to $4.05. However, this only includes mild steel flats, rounds, bar size angles and possibly a few other items. The price of high carbon squares, channels, hexagons, half and full ovals, half rounds, round edged flats, twisted squares, bar shapes, channels, T's and Z's carries another 15¢ a cwt over and above the $4.05 city price used as a base price.

Cold-finished bars now are being sold at a base of $4.95 a cwt on orders of 1000 lb and over. This is the city price. On orders from 500 to 999, the price is $5.35; from 300 to 499 lb, $6.35; under 300 lb, $7.35 a cwt; and individual orders for less than 300 lb, $8.35 a cwt. Thus, the quantity differential for small orders is just about equal to the actual price of the bars. On cold-finished flat over 6-in. wide, there is a differential of $1.50 added to the cold-finished bar price.

Plates are being priced by one firm at $3.85 a cwt, country, and $3.95 a cwt, city delivery, while structural, heretofore the same price as plates, is $3.70 a cwt, country, and $3.80 a cwt, city delivery. Hot-rolled strip is $4.00 a cwt, city delivery.

Horse Laugh

New York

• • • Postponement of a State Dept. parley of 18 European nations seeking to negotiate reciprocal trade agreements is demanded in a House Resolution introduced by Rep. Thomas A. Jenkins (R-Ohio). Its approval would force delay of such action until the Tariff Commission made a study of its necessity and reported back to Congress. A New York economist says that the proposed holdup on the basis of a need for more study would be exceedingly funny if the matter were not so serious. "On my desk," he said, "I have a U. S. Tariff Commission digest on trade agreements in three volumes for a total of 413 pages. And that covers 'Metals and Manufactures' only!"

CPA Set to Eliminate Ceiling of 25 Pct on Rated Steel Orders

Washington

• • • **Scheduled to be** eliminated by CPA this week is the direction which established a ceiling of 25 pct of production on rated orders which steel mills were required to honor after Jan. 1. The action will be taken by revoking Dir. 16 to Order M-21, which was put into effect at the time of the coal strike last December. However, it will not mean a return to large scale issuance of priorities, due to the drastic revision of PR-28, effective Jan. 8, which brought to an almost complete halt the issuance of CC ratings.

In addition, the War Dept. has announced that it has abandoned the use of MM ratings. The Army will rely on CPA directives in the event of future procurement difficulties.

Revocation of Dir. 16 will also permit mills to return to normal distribution practices in regard to warehouses, it was said here. While the 25 pct ceiling will be dropped, it is expected that rated

Such Action However Will Not Mean a Return to a Large Volume of Priorities

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orders will account for an infinitesimal portion of mill production as a result of the rewriting of PR-28.

Under the rewritten regulation, CPA has stopped issuing CC ratings for production materials; maintenance, repair and operating supplies; capital equipment or construction materials or equipment for the purpose of starting or maintaining any individual plant or business or to alleviate individual hardship. This latter provision spells the end of PR-28 as a "bottleneck breaker." Special rating assistance to small businessmen and veterans was also terminated by amending Dir. 20 of the regulation.

Dir. 18 to PR-28, covering iron castings and steel, remains in effect, but ratings will be issued under this direction only for the limited purposes listed below.

CC ratings issued before Jan. 8 remain valid, but this is practically meaningless in regard to iron and steel, since CPA halted the issuance of priorities for iron and steel on Dec. 9, 1946, because of the coal strike, and never lifted the ban.

The revised PR-28 limits the issuance of new ratings to the following limited cases:

(1) Where an item is needed to fill a military order which cannot be deferred without serious results to the defense program or the health and welfare of enlisted personnel.

(2) Where an item is needed to provide essential utility services or, in an emergency, to eliminate serious hazard to the life, health or safety of a large number of people.

(3) Where material or equipment is required in connection with the Veterans' Emergency Housing Program to maintain or increase the production of a building material or product which has been determined to be in critically short supply.

In this connection several points were made clear. No ratings will be issued for the purchase of specialized machinery, such as that used in the manufacture of cement blocks. It was also stressed that rating assistance for items to be incorporated in non-housing construction will no longer be given, this being consistent with the decision to discontinue issuance of HH ratings for items to be used in housing.

Schedule 1 to PR-28 was also revoked. This schedule listed certain critically short materials, the producers of which were entitled to apply for special assistance. It is expected that a new list will be used, limited in scope, to cover critically short items referred to in No. 3 above.

Provisions for the limited priority assistance for exports required for reasons of public policy or for the development of foreign sources of supplies vitally needed in this country remain unchanged.

Coming Events

Jan. 27-29 Industrial Diamond Assn. of America, Inc., annual convention, Atlantic City, N. J.
Jan. 27-31 Electrical Engineering Exposition, New York.
Jan. 27-31 International Heating and Ventilating Exposition, Cleveland.
Jan. 28-Feb. 2 Society of Plastics Engineers, exhibition, Chicago.
Feb. 13-14 First National Ordnance Gage Conference, Lehigh University, Bethlehem, Pa.
Feb. 17 Chicago World Trade Conference, Chicago.
Mar. 2-5 American Society of Mechanical Engineers, spring meeting, Tulsa, Okla.
Mar. 6-8 National Assn. of Foremen, annual national conference of educational directors in industry, Cleveland.
Mar. 17 American Institute of Mining & Metallurgical Engineers, world conference on mineral resources, New York.
Mar. 17-19 American Society of Lubrication Engineers, annual meeting, Pittsburgh.
Mar. 17-19 American Gas Assn., sales conference, Boston.
Mar. 17-19 Chicago Technical Societies Council, production conference, Chicago.
Mar. 19-22 American Society of Tool Engineers, annual meeting, Houston.
Mar. 22 Western Metal Conference and Exposition, American Society for Metals, Oakland, Calif.
Mar. 31-Apr. 2 Midwest Power Conference, Chicago.
Apr. 7 Packaging Machinery Manufacturers Institute, semiannual meeting, Philadelphia.
Apr. 7-10 National Assn. of Corrosion Engineers, convention, Chicago.
Apr. 8-11 American Management Assn., packaging exposition, Philadelphia.
Apr. 29-May 1 Industrial Packaging and Materials Handling Exposition, Industrial Packaging Engineers Assn. of America, Chicago.
May 15-17 Society for Experimental Stress Analysis, annual meeting, Chicago.
June 16-20 American Society for Testing Materials, annual meeting, Atlantic City, N. J.

The London ECONOMIST

Czechoslovakia in 1946

Reprinted by special permission to further understanding on how political and economic affairs are viewed in London.

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COMPARISONS between countries are interesting, instructive and misleading. Yet there are certain valuable parallels between Britain and Czechoslovakia. One is each country's dependence upon external trade, the other is the comparative stability of their political regimes over the last 12 months, notwithstanding that each, in their several ways, is passing through a change that can properly be described as revolutionary.

The Czech trade for the first 10 months of 1946 is shown in the chart (CSR, Czechoslovak Republic). Their trends are encouraging. True, as in Britain today prices form a misleading basis for comparison with the prewar position, but the Czechs themselves are at pains to point out the following facts. First, the population of the country is some 3 million (about 20 pct) less than it was in 1938. Further, the expelled Germans were largely industrial workers with the result that a 20 pct overall loss of productive capacity is no more than what can be expected on this account alone. In fact, they claim production is now running at something like 80 pct of its prewar volume.

Trade returns show a healthily wide distribution of foreign trade. The 10 months' figures of trade with their major customers are as follows:

	Imports	Exports
	(values in 000's of Czech crowns)	
USSR	822,100	1,249,447
Switzerland	777,682	1,562,231
United States	467,437	713,233
Great Britain	540,244	270,323
Germany	320,069	798,254
Sweden	693,567	758,082
Austria	342,237	546,701
Netherlands	335,272	510,228

Poland, largely for political reasons, appears low down on the list, with imports of 18,634,000 kcs and exports of 114,814,000 kcs respectively. The Czechs emphasize, from these figures, that trade with the USSR is only a small percentage of their external trade (on the 10 months the respective percentages of the total are: Imports 11½ pct and exports 12 pct). But the figures are a little misleading because much of the trade with Germany and Austria is on Russian account (similarly some is on American and British accounts).

POLITICALLY, like the rest of the world, Czechoslovakia can look back on 1946 with a feeling that it might well have been worse. There are so many countries in Europe, where the graph of political confidence still points downwards that Czechoslovakia has every reason to be proud of one that on balance still appears to mount.

There are many factors which contribute to this stability. One is that both Czechs and Slovaks are peoples conscious of their unity as a nation. They are not yet one people—and therein lies danger for the future—but they have similar languages, similar traditions and, at bottom, a preference for association with each other as opposed to association with—most probably followed by subjection to — any other people in Europe. The unity of the Czech people was the prime cause of the formation of the National Front Government during the war. The cement then made still binds together Communist and Conservative.

Another factor is the personality of President Benes. He is, in the eyes of the people, their national leader, and all parties are conscious of that. No party would, therefore, lightly embark on any course of action which might call down on them his condemnation or disapproval.

Another element making for stability has been the comparatively close relations between Communists and Social Democrats. When they work together, they muster two thirds of the people behind them. Nor do all the concessions have to come from the Social Democrats.

Finally, there is the Two-Year Plan itself, which came officially into force on the first of this month. It is backed by all parties. The plan, or something of its kind, is essential to the recovery of the nation, and all parties have sufficient care for their country to desire it to succeed. Thus, until its success, or failure, is beyond doubt, each of them will be reluctant to jeopardize its progress by political disagreement at the centre.

THE National Front in the Czechoslovak Government does not mean that each party has abandoned its beliefs or its interests, or that it is content to accept passively everything that its opponents propose. The more usual result is that the arguments and the negotiation of compromises are carried out behind the scenes.

In December the question of annual holidays for 1947 arose. The Communists wanted May Day and Stalin's birthday to be public holidays. The Catholics were concerned to celebrate some of the more established saints. In Britain there would have been public argument. In Czechoslovakia, the arguments were behind closed doors and the result, a compromise, was announced with the bland air of one who implies that there never could have been a dispute over such a straightforward thing as that.

Nor are the traditional methods of party warfare lacking. There is a good and healthy capacity for argument between the four parties, but they still act on the assumption that there must be one government and no opposition. To the mind of a man from Britain, this theory is not attractive. It does seem to deprive the man in the street of what the Englishman considers to be his natural right, to agitate for government action for his benefit individually, not only as a party member or trade unionist.

This political unity does not ex-

(CONTINUED ON PAGE 145)

American Steel Price Move Seen Isolating British Quotations

London

• • • **Rising steel prices** in America are leaving British home prices virtually isolated as the ranking low in the field. Up to date the level has been held down by maximum prices and various subsidies. It seems possible that, barring an unexpected reversal of the world price trend in steel, particularly in America, there will be some movement upward in British prices this year.

The sight of new higher prices in America is also dimming still further the almost extinguished hope of placing some orders for semi-finished steel for delivery from America late this year. Already disappointed at being unable to place substantial tonnages for delivery in the first half of the year, there was some hope remaining in the minds of British officials that if the order situation eased somewhat in the middle of the year as far as American mills were concerned that the outlook might improve.

The dollar shortage, the great bugaboo of all European purchases in the U. S., once more becomes an important factor when British officials see American steel prices going up. The American loan is going to be depleted much more rapidly than was originally planned, due to the increase in prices of all commodities in the U. S., and it looks now as though the dollars will be running very short late in this year.

Considering the many needs of the British domestic economy, the Chancellor of the Exchequer has done a careful job of husbanding the supply of dollars since the loan became available. He is a hard man to convince when any proposal is made, and it is certain that as the dollar balance dwindles, he will be more and more jealous of his hoard. Thus, new proposals for dollar expenditures to import steel will be hard to wangle.

British officials are watching the price trend in the U. S. closely, too, as the price differential which is being paid for present shipments from the U. S. delivered to British works is about $16 to $20 per ton over the domestic price. This differential is partly due to the fact that the only mills in America which are able to make any substantial shipments of ingots and semis to the United Kingdom have been the producers on the West Coast who were being subsidized during the war.

Increases in Steel Prices In The U. S. May Cause Some Changes in Britain

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By JACK R. HIGHT
European Editor

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The difference between the cost of the imported semifinished steel and the domestic price is being paid at present by the government. The Ministry of Supply does all of the actual ordering of the imports, and absorbs the difference between the buying and selling price. The extra cost of the material shipped from America, although substantially less than the prices which Belgian producers offered, may become a factor in the decision to reopen electric steel capacity which has been shut down.

As reported previously, the government has embarked upon a program to utilize a portion of this capacity during the coming year, as offering the only certain alleviation of the steel shortage in England this year. Further increases in prices of imported steel will tend to reduce the comparative cost of steel made in the electric furnaces, and will further tend to reduce any potential demand for semifinished steel from foreign sources.

In addition to paying the difference between the costs of imports and their selling price, there is also another subsidy in freight charges on foreign ores which the government bears. This grant has also tended to keep British prices down, but it is open to question whether these subsidies will be continued after world steel price levels begin to assume a regular pattern.

The existence of "free" prices for steel exports has made it less painful for the British industry to carry on with very low domestic price levels. But the compulsory reduction of steel exports due to the increasingly serious domestic steel shortage will reduce the amount of financial relief from the export side during 1947.

Thus it seems likely that the need for an increase in British domestic steel prices will crop up again before 1947 is too old. This does not mean that the labor government is likely to remove maximum prices on steel for the home market or that the increases will be very great. The pressure from the government will continue throughout the year to be strongly against price increases of such a basic nature as steel, which might heighten the inflationary pressures of the postwar period. Thus, a price increase granted to the steel industry will probably mean, as it did when a general increase was granted in January of 1946, a lopping off of more subsidy concessions. About the only other indirect advantage which the industry has been enjoying has been the continued tight control of scrap prices, which are essentially at 1939 levels plus small allowances for increased freight rates. As a result, prices for heavy grades of scrap in the United Kingdom average about $16 per ton at the present time.

It seems likely that, as prices for iron and steel scrap begin to assume a more or less regular pattern, pressure for some fairly substantial increase in scrap prices will also become strong, but it is not clear at the present time how much if any increase will be permitted by the government.

An increase in steel prices if and when it comes will certainly be used by consuming industries to obtain higher prices for their products if possible. The automotive industry in particular is being pinched in its 1947 production schedule because of a short-

age of steel sheets, and may be embarrassed from a cost standpoint because it is unable to increase production as was originally hoped. The British automobile industry is just now in its period of greatly increasing production after a year of etxensive work in tooling. As a result some of the companies have done quite well from a production standpoint by producing exactly the same vehicle which they were turning out before the war, while some others made an effort to beat the competition by incorporating changes as they went into production. The latter companies thus find themselves in a difficult position because as the sheet shortage became pressing, the Ministry of Supply decided that the automotive companies should be forced to level off their production at substantially their 1946 level. The complaints from some of the motor car manufacturers have been vigorous and, although the Minister of Supply has ordered a study into the sheet situation to see if it is possible to allocate more steel to the motor car industry, it seems doubtful that in the face of increased demands from all consumers there can be any substantially increased allocation to the automotive producers.

There is some promise of a slight increase in sheet production for 1947 which is being made possible by the diversion of semifinished steel from other sections of the industry to sheet and tinplate production, but it seems likely that the steel housing program which is just beginning to reach its highest consumption standard will absorb the increased sheet output.

Steel Export Sources Report No Resistance To New Higher Prices

New York

• • • **Steel export sources** report no sharp resistance to the recent price boosts. The fact is steel export men say, that United States export steel prices are still below world markets, though by just how much on the average has not yet been accurately determined.

Prior to the recent series of price boosts on export iron and steel products American prices were between 30 and 40 pct below the world level. The export increases during the past month, averaging more than the domestic base price increases, have narrowed this gap.

While there have been some cancellations in the face of the new higher prices, those who sell steel abroad are not concerned over the price level at the present time. Neither are licensing requirements of serious concern to most steel producers at this time. Their principal problem is maintaining a happy balance between domestic and export requirements and in many companies the export manager's prime job is a battle to get space on mill order books.

It is known, for instance, that some export orders entered in 1945 are still unfilled and domestic pressure is constantly threatening such scheduling as the export offices have been able to set up. A number of steel officials have privately indicated their belief that a slackening of domestic demand will appear later this year if current high production rates can be held. This should prove a boon to the export market, though it is indicated that the pickup is expected to be in ingots rather than in finished or semifinished products.

While delivery promises are somewhat extended and indefinite today on American exports, foreign competition is not much better in this respect. Some countries, Belgium for example, have been able to take some business here and there with quick delivery promises but they have not been able to do this as a matter of common practice.

It is a matter of common knowledge that sales of thousands of tons of steel for export are being made with quick delivery at high prices but this business is not going through the steel company export offices, which would very much like to put the finger on the source of this material could they but track it down.

Such wildcat sales to distressed consumers both in the United States and abroad are constantly being rumored here. It is anticipated by most observers that they will continue until supply comes closer to demand later this year. Meanwhile the pent up demand for export steel and steel products is estimated as large as 30 to 40 million tons—the amount of peacetime steel products that was not shipped due to the war. On top of this can be superimposed the steel needed for reconstruction.

Leading purchasers of American steel products include Latin America, the Scandinavian countries and France. In the Scandinavian countries much of the material is going into shipbuilding and is being directed there by the government's CXS ratings as is other reconstruction steel to European countries.

JETWING: *Britain's first jet propelled flying wing which will soon make its initial test flights. A 2-seater all-wing ship with a wingspan of about 90 ft, it is powered by two Rolls Royce Derwent turbo-jet engines. Its designers decline to estimate its probable speed.*

Canadian Lead Output Up

Ottawa

• • • **While production** of lead showed a slight gain in October, production of zinc in Canada moved lower in the month, according to the Dominion Bureau of Statistics.

Government to Control Hungarian Heavy Industry

Paris

• • • **Principal heavy** industries in Hungary have been placed under the temporary control of the government of that country under the terms of a recently announced order from the Ministry of Industry. Under the reparations agreement for payment by Hungary to the Soviet Union this means that the industrial establishments will be in government hands until 1952.

The three following companies come under the order: Rimamurany, iron and steel production; Ganz Es Zarsa Danubius, electrical machinery, rolling stock and ship construction; and Manfred Weiss, iron and steel production. These firms are large organizations, and all their subsidiaries and affiliated corporations are included in the order.

The effect of the order is that 17 of the most important works in Hungary, including iron and steel production, engineering industries, railway stock, nonferrous production, and some aircraft facilities come under the direction of a "Heavy Industries Board" which is composed of representatives of various government departments.

The Hungarian Government has specifically stated that there is at present no intention of nationalizing these industries, and that when reparations accounts are settled they will pass again into the hands of the private owners. The agreement states that if the industries show a profit while they are being administered by the government the shareholders are to receive 50 pct of the profit, up to a limit of 3 pct of the capitalization, while losses are to be charged to the government.

Hungary's Total Reparations Bill to the Soviet Union Was Deciding Factor

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The decision to assume control of the operation of these industries was made, according to government sources, because of the high percentage of Hungary's total reparations bill which is to be produced by these works, the importance of their products for reconstruction, and their critical financial condition. The establishments involved employ about 70,000 people, making up nearly 40 pct of the industrial payroll of the country. According to government statistics their indebtedness at the end of last November amounted to 102 foriants (about $8.68 million).

According to the Hungarian Minister for Industry, Mr. Ban, heavy industry has shown considerable progress in reconstruction since liberation, with the aid of considerable assistance from the government. At the end of June, as already reported (see THE IRON AGE, Oct. 31, 1946, p. 91), four of the existing six blast furnaces were in operation. Coal production after a decline early in 1946 is now rising again, and monthly output has reached 500,000 metric tons. Coal imports amounted to 103,000 tons in the first 6 months of the past year, in comparison with 125,000 tons in 1945.

Pig iron production amounts to about 20,000 tons per month, compared with 27,000 tons prewar, while steel ingot production is now averaging about 40,000 tons per month. The government iron and steel machinery works Mavag, at Diosgyor, is producing 14,000

Before the war Hungary was largely dependent upon imports of iron ore. Total imports in the first half of 1946 amounted to about 46,000 tons, compared with 430,000 metric tons for the whole year of 1938. During 1945 the total was 41,000 tons, all of which was shipped by the Soviet Union. An increase in supplies is expected during this year when shipments under a new trade agreement with Sweden are initiated. The agreement with the Scandinavian country calls for 105,000 tons during the year, while a similar arrangement drawn up with Yugoslavia calls for the delivery of 150,000 tons. Approximately 40 pct of Hungary's prewar imports of iron ore came from Yugoslavia.

The Soviet Government has now officially notified the Hungarians that deliveries of reparations in the future will increase progressively as follows: $23 millions in 1947, $25 millions in 1948, and $30 millions annually from 1949 to 1952. The target figure for 1946

TRACTORS CRAWL BACK: *Assembling tractors in the Soviet Karkov tractor plant. This factory was demolished by the Germans but has been rebuilt to aid the nation's implement-starved economy.*

was $21 millions. Following the signature of the reparations agreement a trade agreement was concluded between Hungary and the Soviet Union for an exchange of goods totaling $30 millions, part of which was in the form of raw materials to be supplied by Russia for consumption in the manufacture of reparations.

A Soviet-Hungarian scientific research institute has been established for the exchange of discoveries for the improvement of agricultural production; participating in the reconstruction and development of Hungarian heavy industry; exploring and developing bauxite deposits, oil fields, coal mines; and the development of chemical industries.

Foreign Liquidation Commission to Ask for Canol Surplus Bids

Washington

• • • **Sealed bids for** the surplus facilities of the controversial Canol project are to be asked by the Foreign Liquidation Commission under the terms of an agreement between the United States and Canada which was signed Jan. 10.

Target date for the opening of the bids has been set for on or about Mar. 20. Bids will be accepted for either entire parcels or any individual lot or combination of the offerings.

Property to be disposed of is known as Canol-1, and includes the pipeline from Norman Wells to White Horse, the Whitehorse refinery, and their related facilities. Canols-2, 3 and 4 are not up for sale since they have not been declared surplus; they comprise the distribution system for finished products. It is understood here that these are to remain intact.

More specifically, Canol-1 is composed of two parcels. Parcel A includes the refinery at White Horse and all its units and fittings, powerhouse equipment, crude and finished product tankage, industrial and shop buildings, warehouses and personnel housing, machine shop and garage equipment, including tools.

Parcel B includes the 4- and 6-inch crude pipelines between the refinery and the McKenzie river pumping station, one 80-000- and 12 10,000-gal steel tanks, and all construction, road maintenance and vehicular equipment and spare parts.

Under this latter classification are power shovels, tractors, graders, scrapers, rollers, motor patrols, trucks, half-trucks, pipe-layers, draglines, rippers, compressors, welding machines, bulldozers, sleighs, electric generators and other items.

The refinery, pumping stations and ancillary equipment is reported in generally excellent condition; about 20 pct of the major equipment and vehicular items, however, are listed as used with repairs required or in "poor" condition.

Parcels to Include Pipeline And Other Facilities On Canol-1 Project

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In reporting the contemplated action to Congress, the State Dept. said that an on-the-spot investigation by the office of Foreign Liquidation, Commissioner Gen. Donald H. Connally revealed that the Canol-1 had "no known economic postwar use." It added that it was doubtful if either any governmental agency or private group would want either the pipeline or refinery for use in place.

As a result, an agreement was entered into between the United States and Canada for dismantlement and removal of either or both. Likewise, under the agreement any or all of the facilities may be sold for either export or use in Canada, subject to local laws but exempt from import duties and excise taxes.

A period of 2 years has been fixed for sale and removal. Property remaining at the end of this period may be left as "of no value" unless utilized. Should the abandoned facilities be utilized at some subsequent date, a "fair" compensation would be agreed upon.

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Advisory Group Approves WAA Tool Discount Plan

Washington

• • • **A War Assets Administration** proposal to allow a 12½ pct trade level discount on surplus machine tools to machine tool exporters, machine tool dealers purchasing for their own account for resale, and machine tool rebuilders and manufacturers purchasing for resale was approved by the Metalworking Machinery and Equipment Industry Advisory Committee which met Jan. 14.

Committee members agreed that the discount would materially increase the sale of surplus machine tools. The discount would be applicable also to WAA approved dealers when purchasing for their own account for resale. Commissions of 12½ pct will continue to be paid to these dealers when selling for WAA.

The committee unanimously recommended that all items of general industrial equipment which have fixed prices be included with the items to be sold by approved dealers on commission basis.

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WAA Sets Time Schedule To Speed Surplus Sales

Washington

• • • **In order to further** speed disposal of general classes of surplus, WAA has established a time schedule for such disposal operations which sets specific limits as to the selling time.

For major items received in inventory after Feb. 1, a time schedule of 58 working days for disposal has been set; minor line items must be liquidated within 30 days.

Clearing the way for the "must" disposal schedule, WAA Administrator Littlejohn has ordered that 90 pct of the property previously declared must be offered for sale during February and 100 pct of the items declared after Feb. 1 must be put on sale the same month.

Sales at fixed prices is the general method to be used; after all conditions of fixed-price offerings have been complied with, the remaining unsold property will go on the block on a competitive bid basis.

Iron and Steel Exports in 1945 Reported as 5,109,000 Tons

Washington

• • • **Exports of iron and steel** products (except in advance stages of manufacture) during the year 1945 totaled slightly more than 5,000,000 tons, a decline of about 1,000,000 tons from 1944 and considerably less than the wartime high of 8,700,000 tons, according to the Commerce Dept. (Editor's Note: Preliminary reports by THE IRON AGE indicate a further decline for exports in 1946).

These figures are contained in the second report prepared by the Department's Industrial Reference Service. The first report, representing an effort to bring up to date the jumbled mass of statistics relating to activities since the beginning of the war, covered the war years, 1941 through 1944.

While the Department's figures are now more than a year old and cover only the first 4 postwar months, the overall picture reflected some noticeable changes. These pertained not only to total export tonnages but to quantities by country and the type of products purchased by foreign nations.

During the 5-year period 1940-44, the United Kingdom imported more than 14 million tons of American iron and steel, an average of about 2.8 million tons; in 1945, UK imports had dropped to a low of 41,000 tons with Canada, Soviet Russia and France, in that order, becoming the chief importers and taking more than half our total exports.

After a lapse of more than 4 years, France again became a customer and received more than 580,000 tons, the largest tonnage exported from this country to France in any single year in more than two decades. While Canada and Russia imported about the same amounts as in 1944, about 955,000 and 751,000 tons, there was this difference: Canada bought on a cash basis while virtually all of the Russian commitments were made under lend-lease agreements.

Sweden, Norway, Belgium and Luxembourg resumed purchases from the United States, the first iron and steel products imported from the United States since 1940. While eight South American countries each received more than 60,000 tons during the year, Venezuela alone increased its buying—by 63,000 tons for a total of 233,000 tons; Brazil was the second best South American customer with 315,000 tons.

Exports of All Products Were Off From Wartime Peak; Trend Same in 1946

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Perhaps the most significant change which took place in the final 8 months of war and first 4 months of the postwar period was in the type of products imported.

Shipments of semifinished steel forms—ingots, blooms and billets—dropped from 1,000,000 tons in 1944 to slightly more than 200,000 tons in 1945; on the other hand, structural iron and steel shapes increased by 100 pct to reach a total of more than 600,000 tons. Of the latter, combined shipments to Russia, France, Canada and India accounted for 75 pct.

Also, Russia received large quantities of rails, rail joints and switches for rebuilding its railway systems; the USSR was second to Venezuela in purchases of tubular products. The larger portion of this material was casing and oil line pipe for expansion of the petroleum industry.

About a third, 330,000 tons, of sheets went to Canada, of which the largest part by far was in the ungalvanized class; Canada also took more than 90 pct of all iron and steel skelp shipments. Almost half of the French imports was in the sheet and structural shapes class.

Little change was noted in the export of iron and steel scrap during 1945 when the shipments totalled 96,000 tons. The peak prewar year accounted for more than 4,500,000 tons but in 1943, this had dropped to around 50,000 tons.

U. S. IRON & STEEL EXPORTS BY PRODUCT TYPES

(In Thousands of Short Tons)

Products	1936	1940	1944	1945
Pig iron	6	620	162	91
Ferroalloys	3	42	9	9
Ingots, blooms, etc.	24	2,823	1,107	204
Bars and rods	103	1,142	775	712
Plates	107	642	331	214
Skelp	79	167	158	146
Sheets	236	747	895	930
Strip	69	233	212	142
Tin and Terneplate	269	430	489	528
Structural Shapes	126	628	300	600
Rails	82	289	317	328
RR track material	14	24	135	129
Tubular products	101	500	614	592
Wire and products	125	369	373	313
Castings & forgings	25	71	175	171
	1,368	8,717	6,052	5,109

All figures furnished by the Census Bureau, revised through February 1946. In addition to the comparative years 1944-45, data are given for 1936 and 1940 which represent the low and high export shipments of iron and steel for the 10-year period covered by the above table. Table is adapted from Commerce Dept. tabulations.

Three Plants Up for Sale

Washington

• • • **A Toledo war plant,** built at a cost of $1½ million for the production of marine reduction gears but suitable for general manufacturing purposes, has been offered for sale or lease by WAA. Four buildings contain 180,000 sq ft of space.

Two other plants, costing slightly more than a half-million each, are also up on the block. The Bendix South Bend, Ind., plant which made plane turrets and parts offers more than 141,000 sq ft of industrial space. The other, a Maritime Commission plant for production of Nodulite (lightweight aggregate) at Ellenton, Fla., consists of 22 buildings and 333 acres of ground. The tract is estimated to contain approximately 300,000 cu yd of easy-to-mine Fuller's Earth.

New Cobalt Producer

Paris

• • • **A new company** has been formed in Morocco to establish a works for the treatment of cobalt and nickel ores. The firm is called the Metallurgical and Chemical Co. of North Africa (Somena), and is capitalized at 100 million francs.

Alluvial Tin Mining In Australia

ABOVE

• • *Slag Dump at the Mt. Isa mines, Queensland, Australia. In the period 1925-1929 Australian output, tin content, averaged 2830 tons and dropped to 2400 tons in the war year of 1944.*

ABOVE

• • *Sluicing plant at Nettles Creek in the Mt. Garnet tin mining district. Mt. Garnet is Australia's largest tin producing district, yielding approximately 1000 tons annually.*

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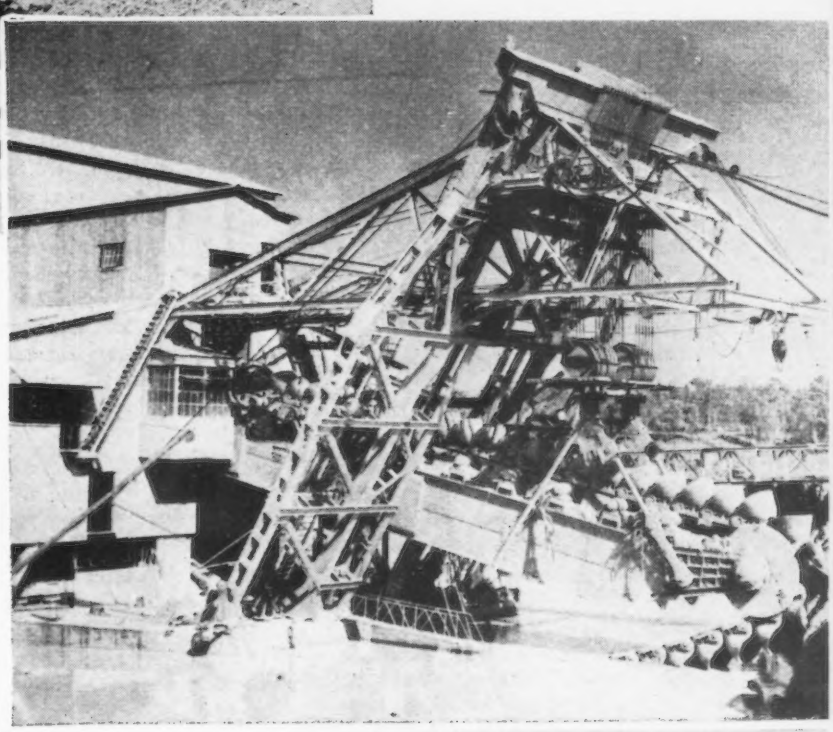

RIGHT

• • *Bucket dredge at Mt. Garnet. This district began increasing its output in 1944. Ranking low in the world production picture, Australia is America's best customer for tinplate and terneplate.*

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RIGHT

• • *The water dam at Mt. Garnet is relatively small, holding an estimated 2000 gal. All the water for dredging at this site is supplied by this dam, and droughts, such as that which occurred in 1944, seriously interfere with operations.*

Industrial Briefs...

• JOINS AFA GROUP — R. G. McElwee, manager of the iron foundry division of the Vanadium Corp. of America, Detroit, has been appointed to the heat treatment cast iron committee of American Foundrymen's Assn.

• TO HEAD GROUP—George N. Sieger, president and general manager of S-M-S Corp. Detroit, has been elected president of the American Welding Society. He has been secretary-treasurer for the Society's Detroit Section since 1941.

• NEW COMPANY — Harold H. C. Lasker, has organized Harold Lasker Co., Inc., New York, which will devote its activities to the production and construction of fabricated plate and structural steel and special industrial equipment.

• CONSOLIDATION — The Milwaukee Stamping Co. has purchased Precision Metal Works Co. of Chicago. Precision will continue as a division of the Milwaukee organization and will make their present line of pressure cookers, metal furniture and sundry metal items.

• MORE PRODUCTION—The Nash Kelvinator Corp. in 1946 built 98,000 cars and have predicted that if allowed uninterrupted production they will build 145,000 units this year. January production is scheduled for 12,000 units. The Kelvinator division, producers of refrigerators, ranges, ice cream cabinets, home freezers and appliances produced 420,000 units in 1946. This is less than half their annual rated capacity of 1,100,000 units.

• SHEET MILL ORDER — Lewis Foundry & Machine Div. of Blaw-Knox Co. has received orders for sheet mills and accessory equipment from the Société Anonyme d'Ougree-Marihaye of Ougree (near Liége), Belgium; and from the Compagnie des Forges d'Audincourt & Dependances, Paris, France.

• REORGANIZATION — Turchan Follower Machine Co. of Detroit, has been reorganized and is now under the sole ownership of M. Turchan. J. Player is general manager.

• EXPANSION PROGRAM — Babcock & Wilcox Co. has announced a program of expanded research in a building on a 20-acre site purchased by it near Alliance, Ohio, from the Buffalo Weaving & Belting Co. All the research activities of the company eventually will be centered in the new research development.

• TO HEAD ENGINEERS—Edgar M. Hastings, Richmond, Va., chief engineer of the Richmond, Fredericksburg & Potomac R. R. Co., has been elected president of the American Society of Civil Engineers for 1947.

• OPENS NEW OFFICE — Northeastern Steel Co., Inc., New York has announced the opening of a Pittsburgh office at 100 Sandusky St., Pittsburgh, under the management of Ray D. Copeland. Mr. Copeland was associated with Bethlehem Steel Co. for the past 20 years as district purchasing agent.

• TO START PRODUCING — The Westinghouse Electric Corp. plant at Beaver, Pa., purchased last summer, and formerly known as the Curtiss-Wright propeller plant, will be manufacturing protective devices and will operate as the Westinghouse Standard Control Div. The new division will be under the direction of J. B. MacNeill. J. A. Butts has been named manager.

• BOILER PLANT SOLD—The 40-year old Schwab Boiler & Machine Co., Milwaukee, has been sold to a group of Milwaukeans headed by Robert W. Gill, former purchasing agent for the Milwaukee Reliance Boiler Works.

Allegheny-Ludlum Co. Launches New Program In Plant Communities

Pittsburgh

• • • **Hiland G. Batcheller**, president of Allegheny-Ludlum Steel Corp., launched a broad public-industrial relations program with a speech to some 350 representative citizens of the Tarentum-Brackenridge communities last week. The program will be extended into all areas where the company has plants or any great concentration of working personnel.

He began the first of this projected series of talks with the statement that "We have finally awakened to our responsibility to the citizens of the plant communities." He told of the company's operating policy and its effects on these communities; and indicated that such policy includes a genuine concern for the welfare of the employees, good wages, fair profits and a desire to prevent "boom and bust."

Mr. Batcheller stated that for the 6500 workers whose families are dependent upon the money they earn from the company, programs of hospitalization, insurance, and safety control have been inaugurated. As to community attitude, the company is working on smoke control—a vital question in Western Pennsylvania — and in 1946 donated some $100,000 to 70 charitable organizations.

Speaking of the wage policies of the company, it was pointed out that during October, 1946, a sample month, Allegheny-Ludlum employees earned 11¢ an hr, or $4.82 a week, more than the average steel worker; 33¢ an hr, or $13.31 a week, more than the average worker in the durable goods industries; and 55.7¢ an hr, or $22.77 a week, more than those in non-durable goods industries. During the war years, Mr. Batcheller stated that the company earned a profit of less than 5 pct. based on sales.

Mines Budget Expanded

Washington

• • • **President Truman** has recommended an increase of nearly $835,000 for the Bureau of Mines, making the total requested appropriation for that department $16,834,000.

Construction Steel . . .

• • • **Fabricated steel awards this week included the following:**

3000 Tons, Venice, Ill., extension to Union Power Co. power station to Stupp Bros. Bridge & Iron Co., St. Louis and Missouri Valley Bridge & Iron Works, Levenworth, Kan., jointly through Stone & Webster Engineering Corp., Boston, engineers.

995 Tons, Shasta Dam, Wash., Coffer Dam, U. S. Bureau of Reclamation to American Bridge Co., Pittsburgh.

590 Tons, China, crane runway through U. S. Steel Export Co. to American Bridge Co., Pittsburgh.

560 Tons, Rosslyn, Pa., Pennsylvania RR., bridge over Chartiers Creek, to Bethlehem Steel Co.

405 Tons, Baton Rouge, La., storage building, Solvay Process Co. to Virginia Bridge Co., Roanoke, Va.

350 Tons, Baton Rouge, La., extension to plant, Solvay Process Co. to Virginia Bridge Co., Roanoke, Va.

300 Tons, Oppossum, Va., power station for Virginia Electric Co. to Bethlehem Steel Co., Bethlehem, Pa., through Stone & Webster Engineering Corp., Boston, engineers.

225 Tons. Victor, Fla., furnace building and slag crushing plant for Victor Chemical Works, to Southern Steel Works Co., Birmingham.

200 Tons, Odair, Wash., machine shop to Worden Allen of Milwaukee.

150 Tons, Bridgeport, Conn., power plant for Bridgeport Brass Co. to Haarman Steel Co., Holyoke, Mass., through Stone & Webster Engineering Corp., Boston, engineers.

120 Tons, Lyles, Tenn., mill building for Tennessee Products Co., to Southern Steel Works Co., Birmingham.

• • • **Fabricated steel inquiries this week included the following:**

8000 Tons, Augusta, Ga., U. S. Engineers.

6180 Tons, Old Lyme-Saybrook, Conn., building.

6000 Tons, Old Lyme, Conn., Connecticut Dept. of Highways, bridge, due Jan. 20.

4000 Tons, San Diego, 10 million cu ft gas holder for Pacific Utility Electric & Service Co.

2460 Tons, Graham, W. Va., power house, Appalachian Electric Power Co.

2000 Tons, Newark, N. J., combination building, Westinghouse Electric & Mfg. Co.

2000 Tons, Rutherford, N. J., New Jersey Dept. of Highways, bridge on Route S-3, due Feb. 13.

555 Tons, Memphis, Tenn., mill building for H. K. Ferguson & Co.

350 Tons, Fort Gibson, Miss., highway bridge, Mississippi State Highway Dept.

160 Tons, Barstow, Calif., diesel shop for Atchison, Topeka & Santa Fe R. R.

120 Tons, Omaha, Neb., warehouse, Massey Harris Co.

120 Tons, Cedar Rapids, Iowa, building, Cherry Burrell Co.

110 Tons, Richmond, Vt., bridge.

100 Tons, Denver, fabricated columns for Midwest Steel & Iron Co.

• • • **Reinforcing bar awards this week included the following:**

475 Tons, Kingman, Ariz., Bureau of Reclamation, Denver, Inv. 7387-A, to Sheffield Steel Corp., Kansas City.

375 Tons, Casper, Wyo., Bureau of Reclamation, Denver, Inv. 19-526-A-2, to Sheffield Steel Corp., Kansas City.

• • • **Reinforcing bar inquiries this week included the following:**

1965 Tons, Adrian, Wash., Bureau of Reclamation, Denver, Inv. G-38, 199-A, bars for West Canal, Columbia Basin Project, bids to **Jan. 24.**

730 Tons, Wilmington, Calif., substructures, units 3, 4 and 5, Harbor Steam Plant, Guy F. Atkinson Co., general contractor.

650 Tons, Urbana, Ill., tunnel for the University of Illinois, low bidder, L. Balkin.

380 Tons, Burlingame, Calif., overcrossings on Bayshore Freeway, California Div. of Highways, Sacramento, bids to Feb. 13.

280 Tons, Odair, Wash., Bureau of Reclamation, Denver, Inv. G-38, 187-A, bars for Grand Coulee Left Power Plant, bids to Jan. 21.

220 Tons, Santa Barbara, Calif., crossing over Southern Pacific R. R. at Salsipuedes St., California Div. of Highways, Sacramento, bids to Feb. 13.

185 Tons, Randall Dam, S. D., railroad trestle, abandoned.

110 Tons, Redding, Calif., bridge across Sacramento River, California Div. of Highways, Sacramento, bids to Feb. 13.

• • • **Plate awards this week included the following:**

105 Tons, San Diego, steel standpipe and appurtenances at Aviation Drive and Benson Ave., to Western Pipe & Steel Co., Los Angeles.

• • • **Sheet piling inquiry this week included the following:**

230 Tons, Ludington, Mich., Milwaukee office, U. S. Engineers for revetments.

• • • **Railroad car inquiries this week included the following:**

Southern Pacific Co., San Francisco, has asked for bids on 6200 new freight cars. Bids are being requested on 3000 light weight steel box cars, 1500 drop-bottom gondola cars, 500 tight-bottom gondolas, 500 automobile cars, 500 flat cars, 100 covered copper cars and 100 gondola sulfur cars. This bid request supplements 5000 new freight cars already purchased, of which only 1000 remain to be delivered.

Finishes Prefab Theater

Hollywood, Calif.

• • • **The first prefab theater to be constructed as a project by Henry J. Kaiser and Charles P. Skouras has been completed at Long Beach and is schedued to be opened the latter part of this month.**

Plans for mass-producing theaters have been under way at the Kaiser engineering headquarters in Oakland for the past 2 years and mass production is contemplated in Los Angeles as soon as materials become available in sufficient quantities.

Allocations Set for French Steel Users

Paris

• • • Allocations of steel to French consumers during the year past have been announced in the press. Substantial increases given in the last quarter amounted to 12 pct for transport, 34 pct for industrial production, 25 pct for agriculture and the food industries, and 18 pct for exports to French colonies. To provide some of these increases the allocation for national defense in the last quarter of 1946 was cut by 25 pct, and exports were cut 6 pct.

The complete allocations table for 1946 follows:

	First quarter	Second quarter	Third quarter	Fourth quarter
	(Thousands of metric tons)			
Power industries	225	207.94	226.17	245.48
Including:				
Coal	123	130	120	128
Electricity	47	58	75	85
Fuels	25.2	12.24	11.32	13.3
Transports	260.7	175	199.47	255.5
Including:				
Railways	150	124	113.85	139
Merchant Marine....	37	21.30	33.5	51
Roads	45	15.85	16.5	22.19
Reconstruction	64.8	31	67.3	83
Industrial production....	459.5	412.14	510.82	688.82
Including:				
Independent workers	28	27.20	31	44.2
Farm equipment	28.8	27.30	43	60
Machine tools.....	16.35	16.78	19.5	24.2
Cars and cycles.....	96.20	103.60	108.5	136.5
Metalworking	53.45	51.53	59	71.80
Foundries	43	38.42	39.7	51.50
Textiles and leather.	15.1	9.91	12.79	15.65
Chemical industries.	19.8	15.28	19.46	24.44
Building material...	18.3	8.64	9.78	12
Iron and steel industry iron ore mines	57.9	61.43	74.91	82.05
Agriculture and food industries	44.5	40.33	47.6	59.82
National defense.....	57.7	66.15	69	56
Including reconversion.	..	56	63	30
Exports and Colonies....	83.6	104.57	115	129
All others	35.4	24.42	30.12	49.38

MACHINE TOOLS

. . . News and Market Activities

Estimates December Machine Tool Shipments at $27 Million

• • • A bird's-eye view of the machine tool industry's December 1946 performance reveals shipments estimated at $27 million, compared with $26,100,000 in November; estimatd orders of $18,500,000, a slight decrease from November's $19,200,000; cancellations of $2 million, almost double November's $1,300,000; and unfilled orders amounting to $161,000,000, a drop from the previous month's $170 million.

About 30 pct of the current backlog is foreign business, which suggests that domestic business leaves something to be desired from the standpoint of the average machine tool builder. In this regard, qualified observers predict that business will probably continue its downward trend until spring, gradually trending upward in the fall.

In Detroit, the volume of inquiries being received by the machine tool industry continues at a brisk pace and somewhat less interference with deliveries, because of shortages of electrical equipment, is reported. Although the volume of sales is reported to be only fair with a good backlog behind it, the industry appears to be settling down to a period of stability which, barring unlooked for developments should last until Mar. 13, when General Motors makes its fateful decision on its new light car. Many observers here are inclined to believe that the Ford price reduction this week has increased the possibility of a favorable GM decision. Thus far, however, the only orders placed for machines to be used on the light car cover machines requiring a certain amount of engineering development; orders for construction work at Cleveland have yet to be given the green light, it is reported.

In Boston and the East, some pickup in sales is reported, but business is by no means brisk. Makers of certain types of lathes, grinding machines, drills, milling machines and drill presses appear to have an edge on sales. It is a toss-up between grinders and lathes for volume leadership. Although the trend of metalworking business this year is not as yet definite, machine tool makers are confident of making money, especially those cultivating export business. The Massachusetts Department of Labor reports industrial activity holding around 100 pct above the prewar 5-year average.

Foreign Business Constitutes Approximately 30 Pct Of Backlog at Present

° ° °

In Cincinnati and Cleveland, much interest attends the move of Cleveland Automatic Machine Co., Cleveland, to Cincinnati, on or about Apr. 1. Long a subject of various rumors, Camco's move to Cincinnati suggests to some observers that business in the present location is not sufficient to warrant operating two plants during peacetime. Consolidation with R. K. LeBlond Machine Tool Co., one of the larger manufacturers of a complete line of lathes, will doubtless result in the saving of considerable money. LeBlond had purchased Camco some time ago and are moving the company down to Cincinnati in an effort to keep the machinery in their local plants in operation and to cut down expenses due to double overhead.

Cincinnati sources report that foreign business has picked up slightly since the first of the year and though domestic business is considered "normal," one source indicated that it is "spotty." Machine tool companes are filling their plants with contracting work in order to keep all their men working and all their machinery in use.

In light of December shipments, the industry is apparently no longer experiencing any acute difficulties in securing deliveries of electrical equipment. However, electrical manufacturers report the following:

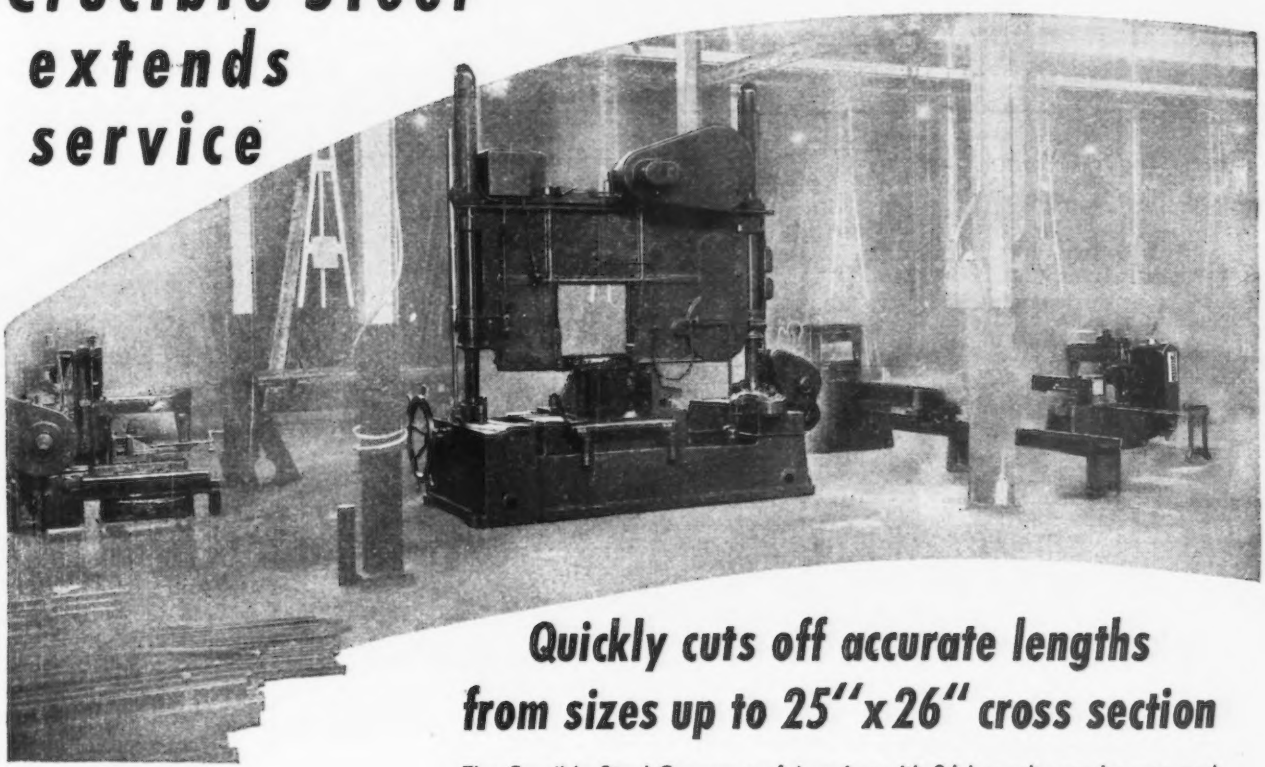
Industrial controls of standard manual types are quoted at 30 weeks; industrial controls requiring engineering are quoted at 60 weeks; the average quotations runs about 50 to 52 weeks on above types.

Integral horsepower motors: Single phase up to 15 hp—a 2 to 3-year backlog with no improvement expected in next year; polyphase motors, 1 to 15 hp, 60 weeks. It is slightly less on strictly standard motors of this type. There is likely to be an improvement on standard motor deliveries in the next 6 months. No improvement on special motors. Polyphase motors, 20 to 75 hp. Deliveries quoted on standards at 42 weeks. Special motors and others up to 200 hp—62 weeks being quoted. It will be a year before there is any improvement on these.

Fractional hp motors—there is an enormous demand for these with at least a 2-year backlog on all except aircraft motors. There is no sign of a decline in the demand. Copper wire and silicon sheet are the tough items of supply here and no real easing of this is expected before late 1947. The easy situation on aircraft motors is because there was no reconversion problem with these types, and the setup established during the war makes their fast production now pretty much of a cinch.

On the surplus side, a proposal by War Assets Administration to allow a 12½ pct trade level discount on surplus machine tools to machine tool exporters, machine tool dealers purchasing for their own account for resale, and machines to rebuilders and manufacturers purchasing for resale was approved by the Metalworking Machinery Equipment Industry Advisory Committee.

Crucible Steel extends service



Quickly cuts off accurate lengths from sizes up to 25"x26" cross section

The Crucible Steel Company of America with 26 branch warehouses and sales offices, has built a reputation for anticipating customers' needs, not only in high grade and special steels, but in service requirements as well. They were among the first to equip several of their warehouses with modern high speed MARVEL Saws (No. 6 and 9A series) in order to give fast service on either single lengths or large quantities of identical pieces, accurately cut from bars up to 10" x 10" cross section. Now in anticipation of new demands for larger sizes, they are the first steel company to install a No. 24 MARVEL Hydraulic Hack Saw in order to give fast service on orders for steels of any type *in sizes up to* 25" x 26" cross section.

This giant hack saw, which almost qualified as a "secret weapon" because it contributed so materially to our production capacity in building naval ordnance, applies an entirely new principle of reciprocation that has made "hacksawing" of large work practical for the first time.

Whatever your metal sawing problems, there is a MARVEL Saw exactly suited to your needs. A MARVEL field engineer will be glad to go over your metal sawing problems with you.

No. 24 MARVEL giant Hydraulic Hack Saw. (capacity 24" x 24"). Employs new "Roll Stroke" sawing action and trouble-free low pressure hydraulic control.

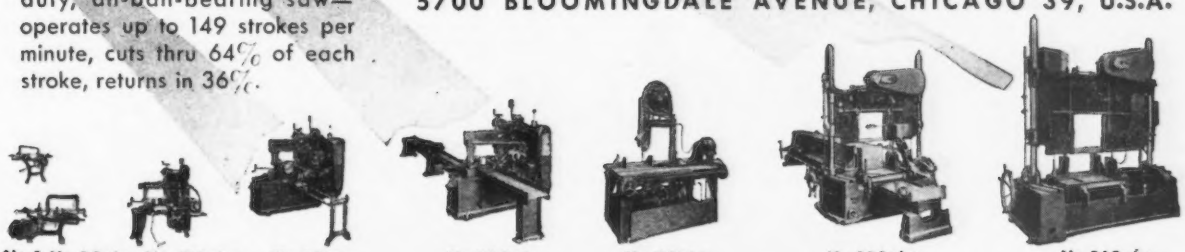
No. 9A MARVEL Production Saw (capacity 10" x 10"). Automatically feeds, measures and cuts-off identical lengths from single or nested bars with no more operator attention than an automatic screw machine.

No. 6 MARVEL Saw (capacity 6" x 6"). A high-speed, heavy-duty, all-ball-bearing saw—operates up to 149 strokes per minute, cuts thru 64% of each stroke, returns in 36%.

ARMSTRONG-BLUM MFG. CO.

"The Hack Saw People"

5700 BLOOMINGDALE AVENUE, CHICAGO 39, U.S.A.



No. 1, No. 2 Series Capacity: 4"x4" Capacity: 6"x6" | No. 4B Series Capacity: 6"x6" | No. 6 Series Capacity: 6"x6" | No. 9A Series Capacity: 10"x10" | No. 8 Series Capacity: 18"x18" | No. 18 Series Capacity: 18"x18" | No. 24 Series Capacity: 24"x24"

MARVEL SAWS

NONFERROUS METALS

. . . News and Market Activities

New Quota Procedure For Premium Payments

Washington

• • • **Operations of** the Premium Price Plan for copper, lead and zinc will be reorganized and placed under the direction of Commissioner Harold Stein of the Office of War Mobilization and Reconversion, effective Jan. 27. The order calling for the reorganization was issued by Major General Philip B. Fleming, Temporary Controls Administrator.

Under the reorganization, staffs of CPA and OPA which have been working on the program will be consolidated as a single unit in the OWMR. Commissioner Stein has appointed Clarence O. Mittendorf, formerly Head Mining Engineer of OPA, as Director of the Premium Price Plan.

The Inter-Agency Quota Committee which formerly passed upon applications from mine operators for premium payments has been abolished. Under new procedures, the Director will recommend assignment of new quotas and revisions in existing quotas to a Review Board composed of representatives of CPA, RFC, and OPA. The reorganization is expected to simplify and expedite the administration of the program.

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RFC Nickel Restricted

Washington

• • • **Relaxation of** controls over purchases from RFC of lead alloy and scrap and tin alloy and scrap containing 50 pct or more (by weight) of the basic metal has been announced by CPA.

No CPA authorization is now needed for the purchase of these items nor are there any restrictions as to who may purchase it. However, end-use restrictions imposed by the CPA tin order, M-43, remain in effect.

At the same time, through revision of Table A, PR-34, metallic nickel and zinc oxide were added to the list of items subject to controls when purchased from RFC. No CPA authorization is required for nickel but it will be sold only to smelters and reprocessors. Authorization is now required for purchases of zinc oxide which will be sold by RFC only in cases of emergency.

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Offer Al Powder Plant

Washington

• • • **A complete manufacturing** plant equipped to produce aluminum powder is being offered for sale or lease by WAA through its Cleveland regional office. Located in Glassmore, Pa., on the west bank of the Allegheny River, the plant, operated during the war by Alcoa, is capable of producing 33,336,000 lb of aluminum powder yearly.

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To Continue Premiums

Washington

• • • **A measure** (HR-871) which would continue premium payments for copper, lead and zinc on a permanent basis and provide for channeling the additional output to the national stockpile has been introduced by Rep. Sam M. Russell (D-Tex).

Disbursements up to $100,000,000 a year by RFC would be authorized to cover conservation payments made in excess of current market prices; the agency would take title to materials so produced for addition to the national stockpile. However, the deliveries of the bonus-produced items could be diverted to industrial users at current market prices upon declaration by the President of a "state of industrial emergency."

•

Lead

New York

• • • **January lead** shipments to consumers are expected to be better than anticipated as a result of a greater tonnage of foreign lead coming in than when OMR was buying abroad. While there is no firm understanding of the cause of the increase in foreign metal, the opinion is hazarded that foreign sellers may be more willing to sell on a monthly delivery basis than on the quarterly basis required by OMR. Secondary lead production is reported to be increasing and sales to consumers are said to be taking place at a premium of half a cent per pound over the price of virgin lead. Without this price incentive there is no reason for secondary smelters to soften and refine lead from battery plates to meet specifications when it could be disposed of as antimonial lead considering the current high price of antimony. Some reported high prices for secondary lead have not yet been confirmed.

•

Allocate 18,500 Tons Tin

Washington

• • • **CPA has approved** the following distribution of tin (long tons) for the first quarter:

Tin and terneplate 8000, brass and bronze 2100, solder 3900, babbitt 2150, tinning 600, collapsible tubes 310, foil 60, chemicals 50, new type metal 100, tinplate and tubing 130, export *50, reserve for appeals, 550, all other 500, total 18,500.

*Interim allocation.

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Decontrol Lead Scrap

Washington

• • • **All restrictions** on WAA sales of surplus battery-lead scrap, antimonial lead, and solder have been removed by CPA.

Sales of these materials were formerly restricted to smelters and refiners.

Nonferrous Metals Prices

Cents per pound

	Jan. 15	Jan. 16	Jan. 17	Jan. 18	Jan. 20	Jan. 21
Copper, electro, Conn.	19.50	19.50	19.50	19.50	19.50	19.50
Copper, Lake, Conn.	19.625	19.625	19.625	19.625	19.625	19.625
Tin, Straits, New York	70.00	70.00	70.00	....	70.00	70.00
Zinc, East St. Louis	10.50	10.50	10.50	10.50	10.50	10.50
Lead, St. Louis	12.80	12.80	12.80	12.80	12.80	12.80

Primary Metals

(Cents per lb, unless otherwise noted)

Aluminum, 99+%, f.o.b. shipping point (min. 10,000 lb)	15.00
Aluminum pig, f.o.b. shipping point	14.00
Antimony, American Laredo Tex.	28.25
Beryllium copper, 3.75-4.25% Be; dollars per lb contained Be	$14.75
Beryllium aluminum, 5% Be; dollars per lb contained Be	$27.50
Cadmium, del'd	$1.50
Cobalt, 97-99% (per lb)	$1.50 to $1.57
Copper, electro, Conn. Valley	19.50
Copper, lake, Conn. Valley	19.625
Gold, U. S. Treas., dollars per oz.	$35.00
Indium, 99.8%, dollars per troy oz.	$2.25
Iridium, dollars per troy oz.	$125.00
Lead, St. Louis	12.80
Lead, New York	13.00
Magnesium, 99.8 + %	20.50
Magnesium, sticks, carlots	36.00
Mercury, dollars per 76-lb flask, f.o.b. New York	$88 to $90
Nickel, electro, f.o.b. New York	37.67
Palladium, dollars per troy oz.	$24.00
Platinum, dollars per troy oz.	$58 to $61
Silver, New York, cents per oz	70.75
Tin, Straits, New York	70.00
Zinc, East St. Louis	10.50
Zinc, New York	11.005
Zirconium copper, 6 pct Zr, per lb contained Zr	$ 6.00

Remelted Metals

Brass Ingot

(Cents per lb, in carloads)

85-5-5-5 ingot	
No. 115	20.50
No. 120	20.00
No. 123	19.50
80-10-10 ingot	
No. 305	23.50
No. 315	22.00
88-10-2 ingot	
No. 210	25.75
No. 215	24.75
No. 245	21.75
Yellow ingot	
No. 405	16.25
Manganese Bronze	
No. 421	18.25

Aluminum Ingot

(Cents per lb, lots of 30,000 lb)

95-5 aluminum-silicon alloys:	
0.30 copper, max.	18.25
0.60 copper, max.	18.00
Piston alloys (No. 122 type)	16.75—17.00
No. 12 alum. (No. 2 grade)	16.50—16.75
108 alloy	16.50—16.75
195 alloy	16.75—17.50
AXS-679	16.50—16.75
Steel deoxidizing aluminum, notch-bar, granulated or shot	
Grade 1—95 pct-97½ pct	16.75—17.00
Grade 2—92 pct-95 pct	16.25—16.50
Grade 3—90 pct-92 pct	15.75—16.00
Grade 4—85 pct-90 pct	15.25—15.50

Electroplating Supplies

Anodes

(Cents per lb, f.o.b. shipping point in 500 lb lots)

Copper, frt. allowed	
Cast, oval, 15 in. or longer	34⅞
Electrodeposited	28⅝
Rolled, oval, straight delivered	29⅛
Curved, 18 in. or longer, delivered	29⅛
Brass, 80-20, frt allowed	
Cast, oval, 15 in. or longer	31¾
Zinc, Cast, 99.99	18¾
Nickel, 99 pct plus, frt allowed	
Cast	51
Rolled, depolarized	52
Silver, 999 fine	
Rolled, 1000 oz lots, per oz	75

Chemicals

(Cents per lb, f.o.b. shipping point)

Copper cyanide, 100 lb drum	34.00
Copper sulphate, 99.5; crystals, bbls	7.75
Nickel salts, single, 425 lb bbls, frt allowed	14.50
Silver cyanide, 100 oz lots, per oz	74.5
Sodium cyanide, 96 pct, domestic, 100 lb drums	15.00
Zinc cyanide, 100 lb drums	33.00
Zinc, sulphate, 89 pct, crystals, bbls, frt allowed	.0635

Mill Products

Aluminum

(Cents per lb, base, subject to extras for quantity, gage, size, temper and finish)

Drawn tubing: 2 to 3 in. OD by 0.065 in. wall: 3S, 43.5¢; 52S-O, 67¢; 24S-T, 71¢; base, 30,000 lb.

Plate: ¼ in. and heavier: 2S, 3S, 21.2¢; 52S, 24.2¢; 61S, 23.8¢; 24S, 24S-AL, 24.2¢; 75S, 75S-AL, 30.5¢; base, 30,000 lb.

Flat Sheet: 0.136-in. thickness: 2S, 3S, 23.7¢; 52S, 27.2¢; 61S, 24.7¢; 24S-O, 24S-OAL, 26.7¢; 75S-O, 75S-OAL, 32.7¢; base, 30,000 lb.

Extruded Solid Shapes: factor determined by dividing the perimeter of the shape by its weight per foot. For factor 1 through 4, 3S, 26¢; 14S, 32.5¢; 24S, 35¢; 53S, 61S, 28¢; 63S, 27¢ 75S, 45.5¢; base, 30,000 lb.

Wire, Rod and Bar: screw machine stock, rounds, 17S-T, ¼ in., 29.5¢; ½ in., 37.5¢; 1 in., 26¢; 2 in., 24.5¢; hexagons, ¼ in., 35.5¢; ½ in., 30¢; 1in., 2 in., 27¢; base, 5000 lb. *Rod:* 2S, 3S, 1¼ to 2½ in. diam, rolled, 23¢; cold-finished, 23.5¢ base, 30,000 lb. *Round Wire:* drawn, coiled, B & S gage 17-18: 2S, 3S, 33.5¢; 56S, 39.5¢; 10,000 lb base; B & S gage 00-1: 2S, 3S, 21¢; 56S, 30.5¢. B & S 15-16: 2S, 3S, 32.5¢; 56S, 38¢; base, 30,000 lb.

Magnesium

(Cents per lb, f.o.b. mill)

Sheet and Plate: Ma, FSa, ¼ in.,54¢-56¢; 0.188 in., 56¢-58¢; B & S gage 8, 58¢-60¢; 10, 59¢-61¢; 14, 69¢-74¢; 16, 79¢-81¢; 18, 87¢-89¢; 22, $1.25-$1.31; 24, $1.71-$1.75. Base quantity, 30,000 lb.

Round Rod: M, diam in. ⅛, 55¢; ¼, 47¢; ⅜, 46¢; ½, 45¢; ¾, 44¢; 1¾, 43.5¢; 2, 42.5¢; 3, 41.5¢; 4, 42.5¢ 5, 43.5¢; 6 & 7 in., 44¢. Base price, 5000-10,000 lb.

Square and Hexagonal Bar: M, diam in. ⅛, 58¢; ¼, 50¢; ⅜, 48¢; ½, 47.5¢; ¾, 46.5¢; 1¾, 45.5¢; 2, 44.5¢; 3, 43.5¢; 4 & 5 in. 44.5¢; 6 & 7 in., 45¢. Base quantity, 5000-10,000 lb.

Tubing: Varies with wall thickness and outside diameter.

Nickel and Monel

(Cents per lb, f.o.b. mill)

	Nickel	Monel
Sheets, cold-rolled	54	43
No. 35 sheets	..	41
Strip, cold-rolled	60	44
Rod		
Hot-rolled	50	39
Cold-drawn	55	44
Angles, hot-rolled	50	39
Plates	52	41
Seamless tubes	83	71
Shot and blocks	..	31

Zinc

(Cents per lb, f.o.b. mill)

Sheet, l.c.l.	15.40
Ribbon, ton lots	14.50
Plates	
Small	13.25
Large, over 12 in.	14.25
Lithographic, engrained	17.25

Copper, Brass, Bronze

(Cents per lb)

	Extruded Shapes	Rods	Sheets
Copper	30.78	....	30.93
Copper, hot-rolled	....	27.28	....
Copper, drawn	....	28.28	....
Low brass, 80 pct	37.52	28.71	29.02
High brass	36.03	27.22	27.53
Red brass, 85 pct	38.03	29.22	29.53
Naval brass	27.50	26.25	32.19
Brass, free cutting	....	22.28	....
Commercial bronze	39.06	30.25	30.56
Manganese bronze	31.07	29.57	35.69
Phosphor bronze, 5 pct	....	49.07	48.82
Muntz metal	27.19	25.94	30.38
Everdur, Herculoy Olympic, etc.	34.45	34.73	35.79
Nickel silver, 5 pct	....	38.11	36.34
Architectural bronze	26.01	....	....

Scrap Metals

(Dealers' buying prices, f.o.b. New York)

Copper and Brass

(Cents per lb)

No. 1 heavy copper and wire	15½—16
No. 2 heavy copper and wire	14½—15
Light copper	13¼—13¾
Auto radiators (unsweated)	11¼—11¾
No. 1 composition	14½—15
No. 1 composition turnings	14 —14½
Clean red car boxes	11 —11½
Cocks and faucets	11½—12
Mixed heavy yellow brass	9 — 9½
Old rolled brass	9 — 9½
Brass pipe	10¾—11¼
New soft brass clippings	11 —11½
Brass rod ends	9¾—10¼
No. 1 brass rod turnings	10 —10½

Aluminum

(Cents per lb)

Alum. pistons with struts	4½— 5
Aluminum crankcases	7½— 8
2S aluminum clippings	8¼— 8½
Old sheet & utensils	7½— 8
Mixed borings and turnings	3 — 3¼
Misc. cast aluminum	7 — 7½
Dural clips (24S)	6 — 6½

Zinc

(Cents per lb)

New zinc clippings	7 — 7½
Old zinc	5¼— 5¾
Zinc routings	3 — 3½
Old die cast scrap	3 — 3¼

Nickel and Monel

(Cents per lb)

Pure nickel clippings	21 —22
Clean nickel turnings	17 —18
Nickel anodes	19½—20½
Nickel rod ends	20 —21
New Monel clippings	14 —15
Clean Monel turnings	10 —11
Old sheet Monel	12 —12½
Old Monel castings	10 —11
German silver clippings, mixed	10½—11
German silver turnings, mixed	7 — 7¼

Lead

(Cents per lb)

Soft scrap lead	11 —11½
Battery plates (dry)	5¼— 5½

Miscellaneous

(Cents per lb)

Block tin	60
No. 1 pewter	46 —48
No. 1 auto babbitt	36 —37
Mixed common babbitt	12 —12½
Solder joints	13½—14
Siphon tops	38
Small foundry type	15 —15½
Monotype	12½—13
Lino and stereotype	12 —12½
Electrotype	10 —10½
New type shell cuttings (nom.)	12 —12½
Clean hand picked type shells	5½— 6
Lino and stereo dross	6 — 6½
Electro dross	4 — 4½

Lead Products

(Cents per lb)

F.o.b. shipping point freight collect. Freight equalized with nearest free delivery point.

Full lead sheets	16.25
Cut lead sheets	16.75
Lead pipe, manufacturing point	15.50
Lead traps and bends	List +38%
Combination lead and iron bends and ferrules, also combination lead and iron ferrules	List +38%
Lead wool	17.50

SCRAP

. . . News and Market Activities

Strong Bullish Tone Dominates Market

New York

• • • **A strong bullish tone** swept through many of the nation's scrap markets early this week—perhaps a stronger tone than any shown since the recent $5 price zoom. Advances in heavy melting steel were posted at Cleveland and New York, while both Pittsburgh and Philadelphia reported a definite bullish feeling.

Railroad specialty prices were running to fantastic figures in same cases. The high bids were generally those of distress purchasers since most of the larger mills and foundries have been balking at the current specialty prices.

Commenting on the erratically high prices of railroad specialties trade sources say that some conversion deals are responsible in large part for some of the high rail prices. Many regular rail buyers won't touch the present market with a pair of 10-ft tongs but some mills are rerolling on a contract basis.

The current jittery action of the scrap market appears to bear out those who maintain that earmarked shipments, conversion deals and tie-in sales have made the market too thin on the volume side and too sensitive pricewise. This skittishness has led some observers to doubt that prices posted early this week will be the same toward its close.

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PITTSBURGH—Despite a bullish market in Pittsburgh this week, mills are holding to the $32 to $32.50 price level for openhearth grades. The indications are that this price may not hold for the remainder of the week. The railroad lists indicate that specialties will continue to move up, further widening the spread between No. 1 and these grades. The market is probably more bullish this week than at any time since it moved from the $25 level. Some brokers are desperately trying to cover all orders at $32.50 but feel that they're going to get caught in the up moving market. Remote scrap is reported to be selling to the consumer at $28.50 in New Jersey, which means a price somewhere in the neighborhood of $36.25 a ton Pittsburgh or Wheeling. Purchases at this price, however, are denied in this area. Brokers are again talking loudly of conversion deals, but all individually deny they're involved.

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CHICAGO—Heavy melting prices on all openhearth scrap remained steady during the past week. Users of cast iron and malleable are still desperate and this is one of the factors responsible for the high prices paid for recent material from the railroads. Rerollers still can't obtain rails for conversion because of the high prices bid by the interests who have arrangements for selling the conversion products at premium prices. These same mills will, however, contract to roll the rails for a fixed charge and thereby keep their crews working. The average conversion price charged for such work is reported to be $35 a net ton. Local mills say they did not buy the small amounts of railroad heavy melting that were bought for $31.14 a gross ton by brokers. This scrap, they say, will only be sold to them at the going price of $31 delivered or be shipped elsewhere.

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PHILADELPHIA—The market was strong here last week but there is no change in heavy melting grades. Mills are not short of scrap but most have little or no winter stockpile. It is generally agreed that the higher prices and the beginning of the new year are bringing out larger tonnages. Although it is reported that most low phos buyers are out of the market, contracts have been placed by certain buyers at higher prices than previously quoted. Clean cast chemical borings is also being bought at higher prices. Cast grades are up from $1 to $2. The price of rail steel wheels and coil springs is set by the current B & O list.

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NEW YORK—This market began to show some price activity beginning in the middle of last week as prices of heavy melting steel advanced by as much as $1 on some shipments though early this week it appeared that $27.50 represented the brokers' buying price on most orders. Turnings also showed some strength. Cast prices continue to vary widely with some distress sales of small lots reported in the neighborhood of $45. No marked increase in scrap shipments is reported but volume is said to be better than the average of the last few months of 1946.

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DETROIT—The price of heavy melting and bundles remains unchanged this week at $26.75 to $27.25 per gross ton f. o. b. cars although an increase of 50¢ in machine shop turnings, short shovel turnings and cast iron borings reflects a somewhat stronger market for these particular grades. With local mills buying f. o. b. consuming point and substantial shipments moving out of town on allocation prices quoted continue to reflect a market that is still not quite like transactions in a free market. The supply of scrap is easier than in December but shutdowns in auto plants to make model changeovers are expected to be reflected soon in lower scrap movements.

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CLEVELAND—Prices advanced again over the week-end in the local market, with No. 1 heavy melting bringing $32. The market is very strong, with shipments to some consumers with orders out holding up fairly well, although very little good scrap is being offered and some mills have been sounded out on taking heavy melting as low phos. In the Valley, the going price of heavy melting is $32.50 but this is yard scrap and preferred No. 1 is bringing $35 according to reports.

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BOSTON — Quotations have become stabilized here and as a result, steel mill material is moving more freely. Some brokers report best business in more than a year. In contrast, demand for cast continues in excess of supply with all grades on a $40 to $45 a ton basis. Large consumers are paying $40 to $42 a ton; smaller ones $42.50 to $45, the top only occasionally, however.

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BUFFALO—Pressure for cast scrap at fantastic distress prices is reported tapering off in this district, influenced by the refusal of two leading users to go above $32.50. As a result, the bulk of the available supplies has been going to smaller melters and the market probably is closer to $35 than $40 a ton. Small sales of No. 1 industrial heavy melting have been made at $32, in line with the price for railroad scrap but they are not generally regarded as establishing No. 1 at a premium over No. 2 heavy melting. Most yards report the volume of No. 1 industrial is so light that segregation is not worth while.

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CINCINNATI—Price tendency on steel scrap appears to be settling with only occasional resistance to current prices. Iron grades show little change but demand for all items is still in excess of supply with melters seeking material avidly. With pig iron also none too plentiful, melters are being pinched from both the scrap and raw materials angles to keep the melt at present levels.

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ST. LOUIS—Tie-in sales of scrap iron have caused a decline in the movement of scrap iron to the St. Louis industrial district, some material which should normally be shipped to St. Louis is going to other markets. Tie-ins have also made uncertain market prices. Foundry grades, especially springs, are stronger because of heavier demand, while grey iron grade demand has eased up because of larger inventories. The railroad movement is improved.

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BIRMINGHAM—Inclement weather has hampered scrap preparation here and mill inventories remain small. About the only material moving out of this district to northern points is cast. Railroads are offering considerable scrap with purchasers paying premium prices for special grades.

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TORONTO—Some improvement was reported in scrap iron and steel receipts and deliveries to consumers in the past few days as a result of better transportation conditions. While most of the scrap continues to come from industrial plants a few shipments arrived from the rural districts to stimulate offerings. However, the supply situation remains tight and consumers are receiving only about 35 pct of their actual requirements.

Going prices as obtained in the trade by IRON AGE editors, based on representative tonnages. Pending establishment of a market in some districts and in certain grades, the former OPA ceiling price is inserted for reference, followed by an asterisk.

PITTSBURGH

Per gross ton delivered to consumer:

No. 1 hvy. melting	$32.00 to $32.50
RR. hvy. melting	32.00 to 32.50
No. 2 hvy. melting	32.00 to 32.50
RR. scrap rails	38.00 to 39.00
Rails 3 ft. and under	42.00 to 43.00
No. 1 comp'd bundles	32.00 to 32.50
Hand bdld. new shts.	32.00 to 32.50
Hvy. axle turn.	32.00 to 32.50
Hvy. steel forge turn.	32.00 to 32.50
Mach. shop turn.	27.50 to 28.00
Short shov. turn.	28.00 to 28.50
Mixed bor. and turn.	27.50 to 28.00
Cast iron borings	28.00 to 28.50
No. 1 cupola cast	40.00 to 40.75
Heavy breakable cast	30.00 to 32.00
Malleable	38.00 to 39.00
RR. knuck. and coup.	39.50 to 40.00
RR. coil springs	39.50 to 40.00
Rail leaf springs	39.50 to 40.00
Rolled steel wheels	39.50 to 40.00
Low phos.	36.00 to 36.50

CHICAGO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$29.50 to $30.00
No. 2 hvy. melting	29.50 to 30.00
No. 1 bundles	29.50 to 30.00
No. 2 dealers' bndls.	29.50 to 30.00
Bundled mach. shop turn.	29.50 to 30.00
Galv. bundles	27.50 to 28.00
Mach. shop turn.	24.50 to 25.00
Short shovels, turn.	26.50 to 27.00
Cast iron borings	24.50 to 26.00
Mix. borings & turn.	24.50 to 25.00
Los. phos. hvy. forge	33.50 to 36.00
Low phos. plates	32.50 to 35.00
No. 1 RR. hvy. melt.	30.50 to 31.00
Reroll rails	33.50 to 34.50
Miscellaneous rails	38.00 to 40.00
Angles & splice bars	39.00 to 39.50
Locomotive tires, cut	37.00 to 37.50
Cut holster & side frames	35.50 to 36.00
Standard stl. car axles	39.00 to 39.50
No. 3 steel wheels	36.50 to 37.00
Couplers & knuckles	33.00 to 35.00
Malleable	43.50 to 45.00
No. 1 mach. cast	43.50 to 45.00
Rails 2 ft. and under	43.00 to 45.00
No. 1 agricul. cast	38.00 to 38.50
Hvy. breakable cast	38.00 to 38.50
RR. grate bars	35.00 to 36.00
Cast iron brake shoes	35.00 to 36.00
Stove plate	36.00 to 38.50
Clean auto cast	37.00 to 40.00
Cast iron carwheels	35.75 to 37.00

CINCINNATI

Per gross ton delivered to consumer:
Cast grades f.o.b. shipping point

No. 1 hvy. melting	$28.50 to $29.00
No. 2 hvy. melting	28.50 to 29.00
No. 1 bundles	28.50 to 29.00
No. 2 bundles	28.50 to 29.00
Mach. shop turn.	23.50 to 24.00
Shoveling turn.	24.50 to 25.00
Cast iron borings	23.50 to 24.00
Mixed bor. & turn.	23.50 to 24.00
Low phos. plate	30.50 to 31.00
No. 1 cupola cast	33.00 to 35.00
Hvy. breakable cast	31.00 to 33.00
Stove plate	.... 28.00
Scrap rails	.... 26.00

BOSTON

Dealers' buying prices per gross ton, f.o.b. cars

No. 1 hvy. melting	$25.00 to $26.00
No. 2 hvy. melting	25.00 to 26.00
Nos. 1 and 2 bundles	25.00 to 26.00
Busheling	25.00 to 26.00
Turnings, shovelings	22.00 to 23.00
Machine shop turn.	22.00 to 23.00
Mixed bor. & turn.	19.00 to 20.00
Cl'n cast. chem. bor.	21.00 to 22.00
No. 1 machinery cast	40.00 to 45.00
No. 2 machinery cast	40.00 to 45.00
Heavy breakable cast	40.00 to 45.00
Stove plate	40.00 to 45.00

DETROIT

Per gross, ton, brokers' buying prices, f.o.b. cars:

No. 1 hvy. melting	$26.75 to $27.25
No. 2 hvy. melting	26.75 to 27.25
No. 1 bundles	26.75 to 27.25
New busheling	26.75 to 27.25
Flashings	26.75 to 27.25
Mach. shop turn.	19.75 to 20.75
Short shov. turn.	21.75 to 22.25
Cast iron borings	$21.25 to $21.75
Mixed bor. & turn.	20.75 to 21.25
Low phos. plate	29.25 to 29.75
No. 1 cupola cast	41.25 to 41.25
Charging box cast	40.25 to 43.25
Hvy. breakable cast	37.25 to 39.25
Stove plate	37.25 to 39.25
Automotive cast	nominal

PHILADELPHIA

Per gross ton delivered to consumer:

No. 1 hvy. melting	$30.50 to $31.50
No. 2 hvy. melting	30.50 to 31.50
No. 2 bundles	30.50 to 31.50
Mach. shop turn.	23.00 to 24.00
Shoveling turn.	25.00 to 26.00
Mixed bor. & turn.	23.00 to 24.00
Clean cast chemical bor.	29.00 to 30.00
No. 1 cupola cast	42.00 to 44.00
Hvy. breakable cast	41.00 to 42.00
Cast. charging box	41.00 to 42.00
Clean auto cast	42.00 to 44.00
Hvy. axle forge turn.	31.50 to 32.50
Low phos. plate	35.00 to 36.00
Low phos. punchings	35.00 to 36.00
Low phos. bundles	32.50 to 33.50
RR. steel wheels	36.50 to 37.50
RR. coil springs	36.50 to 37.50
RR. malleable	44.00 to 45.00

ST. LOUIS

Per gross ton delivered to consumer:

No. 1 hvy. melting	$28.25 to $28.75
Bundled sheets	28.25 to 28.75
Mach. shop turn.	23.25 to 23.75
Locomotive tires, uncut	30.00 to 31.00
Misc. std. sec. rails	32.00 to 35.00
Rerolling rails	40.00 to 42.00
Steel angle bars	35.00 to 37.00
Rails 3 ft. and under	35.00 to 36.00
RR. springs	39.00 to 41.00
Steel car axles	32.00 to 33.00
Stove plate	32.00 to 33.00
Grate bars	30.00 to 32.50
Brake shoes	32.00 to 33.00
Malleable	40.00 to 42.00
Cast iron carwheels	35.00 to 36.00
No. 1 machinery cast	36.00 to 38.00
Breakable cast	25.00 to 27.50

BIRMINGHAM

Per gross ton delivered to consumer:

No. 1 hvy. melting	$27.00 to $27.50
No. 2 hvy. melting	27.00 to 27.50
No. 2 bundles	27.00 to 27.50
No. 1 busheling	27.00 to 27.50
Long turnings	17.00 to 18.00
Shoveling turnings	18.00 to 19.00
Cast iron borings	17.00 to 18.00
Bar crops and plate	28.00 to 29.00
Structural and plate	28.00 to 29.00
No. 1 cast	34.00 to 38.00
Stove plate	30.00 to 35.00
Steel axles	29.00 to 30.00
Scrap rails	28.00 to 29.00
Rerolling rails	30.00 to 31.00
Angles & splice bars	30.00 to 31.00
Rails 3 ft & under	31.00 to 32.00
Cast iron carwheels	29.50 to 30.00

YOUNGSTOWN

Per gross ton delivered to consumer:

No. 1 hvy. melting	$32.00 to $32.50
No. 2 hvy. melting	32.00 to 32.50
Low phos. plate	34.00 to 34.50
No. 1 busheling	32.00 to 32.50
Hydraulic bundles	32.00 to 32.50
Mach. shop turn.	26.50 to 27.00
Short. shovel, turn.	27.50 to 28.00
Cast iron borings	27.50 to 28.00
Elec. furnace punch	34.00 to 34.50

NEW YORK

Brokers' buying prices per gross ton, on cars:

No. 1 hvy. melting	$27.00 to $27.50
No. 2 hvy. melting	27.00 to 27.50
Comp. black bundles	27.00 to 27.50
Comp. galv. bundles	25.00 to 25.50
Mach. shop turn.	21.00 to 21.50
Mixed bor. & turn.	21.00 to 21.50
Shoveling turn.	23.00 to 23.50
No. 1 cupola cast	38.00 to 39.00
Hvy. breakable cast	33.00 to 36.00
Charging box cast	$38.00 to $39.00
Stove plate	38.00 to 39.00
Clean auto cast	38.00 to 39.00
Unstrip. motor blks.	25.00 to 27.00
Cl'n chem. cast bor.	24.00 to 25.00

BUFFALO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$28.50 to $29.00
No. 1 bundles	28.50 to 29.00
No. 2 bundles	28.50 to 29.00
No. 2 hvy. melting	28.50 to 29.00
Mach. shop turn.	18.75 to 19.25
Shoveling turn.	20.75 to 21.25
Cast iron borings	19.75 to 20.25
Mixed bor. & turn.	18.75 to 19.25
No. 1 cupola cast	35.00 to 40.00
Charging box cast	29.00 to 30.00
Stove plate	30.00 to 35.00
Clean auto cast	35.00 to 40.00
Malleable	33.00 to 33.50
Low. phos. plate	31.00 to 32.00
Scrap rails	29.75 to 30.25
Rails 3 ft. & under	31.75 to 32.25
RR. steel wheels	32.75 to 33.25
Cast iron carwheels	31.00 to 31.50
RR. coil & leaf spgs.	32.75 to 33.25
RR. knuckles & coup.	32.75 to 33.25
No. 1 busheling	28.50 to 29.00

CLEVELAND

Per gross ton delivered to consumer:

No. 1 hvy. melting	$31.50 to $32.00
No. 2 hvy. melting	31.50 to 32.00
Compressed sheet stl.	31.50 to 32.00
Drop forge flashings	31.50 to 32.00
No. 2 bundles	31.50 to 32.00
Mach. shop turn.	25.50 to 26.00
Short shovel	26.00 to 26.50
No. 1 busheling	31.50 to 32.00
Steel axle turn.	31.50 to 32.00
Cast iron borings	26.00 to 26.50
Mixed bor. & turn.	26.00 to 26.50
No. 1 machinery cast	40.00 to 45.00
Malleable	38.50 to 39.00
Railroad cast	40.00 to 45.00
Railroad grate bars	34.00 to 34.50
Stove plate	37.00 to 37.50
RR. hvy. melting	31.50 to 32.00
Rails 3 ft. & under	38.00 to 38.50
Rails 18 in. & under	40.00 to 40.50
Rails for rerolling	37.00 to 37.50
Elec. furnace punch	34.00 to 34.50

SAN FRANCISCO

Per gross ton delivered to consumer:
Cast grade f.o.b. shipping point

No. 1 hvy. melting	$19.50
No. 2 hvy. melting	19.50
No. 2 bales	19.50
No. 3 bales	16.00
Mach. shop turn.	13.00
Elec. furn. 1 ft. und.	19.50*
No. 1 cupola cast	32.00
RR. hvy. melting	20.50

LOS ANGELES

Per gross ton delivered to consumer:
Cast grade f.o.b. shipping point

No. 1 hvy. melting	$19.50
No. 2 hvy. melting	19.50
No. 1 bales	19.50
No. 2 bales	19.50
No. 3 bales	16.00
Mach. shop turn.	13.00
No. 1 cupola cast	25.00
RR. hvy. melting	20.50

SEATTLE

Per gross ton delivered to consumer:
Cast grade f.o.b. shipping point

No. 1 & No. 2 hvy. melting	$19.00
Elec. furn. 1 ft. und.	19.00
No. 1 cupola cast	25.00*
RR. hvy. melting	20.00

HAMILTON, ONT.

Per gross ton delivered to consumer:
Cast grades f.o.b. shipping point

Heavy melting	$17.50*
No. 1 bundles	17.50*
No. 2 bundles	17.00*
Mixed steel scrap	15.50*
Rails, remelting	18.50*
Rails, rerolling	21.50*
Bushelings	13.00*
Mixed borings & turnings	12.50*
Electric furnace bundles	20.50*
Manganese steel scrap	20.00*
No. 1 cast	19.00*
Stove plate	17.50*
Car wheels, cast	19.50*
Malleable iron	16.00*

Comparison of Prices . .

Advances over past week in Heavy Type, declines in *Italics*. Prices are f.o.b. major basing points. The various basing points for finished and semifinished steel are listed in the detailed price tables.

Flat-Rolled Steel: (cents per pound)	Jan. 21, 1947	Jan. 14, 1947	Dec. 17, 1946	Jan. 22, 1946
Hot-rolled sheets	2.50	2.50	2.50	2.20
Cold-rolled sheets	3.20	3.20	3.20	3.05
Galvanized sheets (10 ga.)	3.55	3.55	3.55	3.70
Hot-rolled strip	2.50	2.50	2.50	2.10
Cold-rolled strip	3.20	3.20	3.20	2.80
Plates	2.65	2.65	2.50	2.25
Plates, wrought iron	5.95	5.95	4.112	3.80
Stain's c-r strip (No. 302)	30.30	30.30	30.30	28.00
Tin and Terneplate: (dollars per base box)				
Tinplate, standard cokes	$5.75	$5.75	$5.00	$5.00
Tinplate, electro (0.50 lb)	5.05	5.05	4.50	4.50
Special coated mfg. ternes	4.90	4.90	4.30	4.30
Bars and Shapes: (cents per pound)				
Merchant bars	2.60	2.60	2.60	2.25
Cold-finished bars	3.20	3.20	3.10	2.75
Alloy bars	3.05	3.05	2.92	2.70
Structural shapes	2.50	2.50	2.35	2.10
Stainless bars (No. 302)	25.97	25.97	25.97	24.00
Wrought iron bars	6.15	6.15	4.76	4.40
Wire and Wire Products: (cents per pound)				
Bright wire	3.30	3.30	3.05	2.75
Wire nails	3.75	3.75	3.75	2.90
Rails: (dollars per 100 lb)				
Heavy rails	$2.50	$2.50	$2.50	$43.00*
Light rails	2.85	2.85	2.85	45.00*
*per gross ton				
Semifinished Steel: (dollars per gross ton)				
Rerolling billets	$42.00	$42.00	$39.00	$36.00
Sheet bars	50.00	50.00	38.00	36.00
Slabs, rerolling	42.00	42.00	39.00	36.00
Forging billets	50.00	50.00	47.00	42.00
Alloy blooms, billets, slabs	61.00	61.00	58.43	54.00
Wire Rods and Skelp: (cents per pound)				
Wire rods	2.55	2.55	2.30	2.15
Skelp	2.35	2.35	2.05	1.90

Pig Iron: (per gross ton)	Jan. 21, 1947	Jan. 14, 1947	Dec. 17, 1946	Jan. 22, 1946
No. 2, foundry, Phila.	$32.43	$32.43	$32.43	$27.59
No. 2, Valley furnace	30.50	30.50	30.50	25.75
No. 2, Southern, Cin'ti	31.75	31.75	29.80	26.19
No. 2, Birmingham	26.88	26.88	26.88	22.13
No. 2, foundry, Chicago†	30.50	30.50	30.50	25.75
Basic, del'd eastern Pa.	31.93	31.93	31.93	27.09
Basic, Valley furnace	30.00	30.00	30.00	25.25
Malleable, Chicago†	30.50	30.50	30.50	25.75
Malleable, Valley	30.50	30.50	30.50	25.75
Charcoal, Chicago	42.99	42.99	42.34	42.34
Ferromanganese‡	135.00	135.00	135.00	135.00

† The switching charge for delivery to foundries in the Chicago district is $1 per ton.
‡ For carlots at seaboard.

Scrap: (per gross ton)				
Heavy melt'g steel, P'gh.	$32.25	$32.25	$30.25	$20.00
Heavy melt'g steel, Phila.	31.00	31.00	29.00	18.75
Heavy melt'g steel, Ch'go	29.75	29.75	25.25	18.75
No. 1, hy. comp. sheet, Det.	27.00	27.00	22.32	17.32
Low phos. plate, Youngs'n	34.25	34.25	32.75	22.50
No. 1, cast, Pittsburgh	40.38	40.38	35.00	20.00
No. 1, cast, Philadelphia.	43.00	41.50	40.50	20.00
No. 1, cast, Chicago	44.25	42.50	39.75	20.00
Coke, Connellsville: (per net ton at oven)				
Furnace coke, prompt	$8.75	$8.75	$8.75	$7.50
Foundry coke, prompt	8.50	8.50	8.50	9.00
Nonferrous Metals: (cents per pound to large buyers)				
Copper, electro., Conn.	19.50	19.50	19.50	12.00
Copper, Lake, Conn.	19.625	19.625	19.625	12.00
Tin, Straits, New York	70.00	70.00	70.00	52.00
Zinc, East St. Louis	10.50	10.50	10.50	8.25
Lead, St. Louis	12.80	12.80	12.35	6.35
Aluminum, virgin	15.00	15.00	15.00	15.00
Nickel, electrolytic	37.67	37.67		35.00
Magnesium, ingot	20.50	20.50	20.50	20.50
Antimony, Laredo, Tex.	28.25	28.25	23.50	14.50

Composite Prices . .

Starting with the issue of Apr. 22, 1943, the weighted finished steel index was revised for the years 1941, 1942 and 1943. See explanation of the change on p. 90 of the Apr. 22, 1943, issue. Index revised to a quarterly basis as of Nov. 16, 1944; for details see p. 98 of that issue. The finished steel composite prices for the current quarter are an estimate based on finished steel shipments for the previous quarter. These figures will be revised when the actual data of shipments for this quarter are compiled.

	FINISHED STEEL	PIG IRON	SCRAP STEEL
Jan. 14, 1947	2.87255¢ per lb.	$30.14 per gross ton	$31.00 per gross ton
One week ago	2.87255¢ per lb.	$30.14 per gross ton	$31.00 per gross ton
One month ago	2.75655¢ per lb.	$30.14 per gross ton	$28.17 per gross ton
One year ago	2.54490¢ per lb.	$25.37 per gross ton	$19.17 per gross ton

	HIGH		LOW		HIGH	LOW	HIGH	LOW
1947	2.87255¢		2.87255¢		$30.14	$30.14	$31.00	$31.00
1946	2.83599¢	Dec. 31	2.54490¢	Jan. 1	$30.14 Dec. 10	$25.37 Jan. 1	$31.17 Dec. 24	$19.17 Jan. 1
1945	2.44104¢	Oct. 2	2.38444¢	Jan. 2	25.37 Oct. 23	23.61 Jan. 2	19.17 Jan. 2	18.92 May 22
1944	2.30837¢	Sept. 5	2.21189¢	Oct. 5	$23.61	$23.61	19.17 Jan. 11	15.76 Oct. 24
1943	2.29176¢		2.29176¢		23.61	23.61	$19.17	$19.17
1942	2.28249¢		2.28249¢		23.61	23.61	19.17	19.17
1941	2.43078¢		2.43078¢		$23.61 Mar. 20	$23.45 Jan. 2	$22.00 Jan. 7	$19.17 Apr. 10
1940	2.30467¢	Jan. 2	2.24107¢	Apr. 16	23.45 Dec. 28	22.61 Jan. 2	21.83 Dec. 30	16.04 Apr. 9
1939	2.35367¢	Jan. 3	2.26689¢	May 16	22.61 Sept. 19	20.61 Sept. 12	22.50 Oct. 3	14.08 May 16
1938	2.58414¢	Jan. 4	2.27207¢	Oct. 18	23.25 June 21	19.61 July 6	15.00 Nov. 22	11.00 June 7
1937	2.58414¢	Mar. 9	2.32263¢	Jan. 4	23.25 Mar. 9	20.25 Feb. 16	21.92 Mar. 30	12.67 June 9
1936	2.32263¢	Dec. 28	2.05200¢	Mar. 10	19.74 Nov. 24	18.73 Aug. 11	17.75 Dec. 21	12.67 June 8
1935	2.07642¢	Oct. 1	2.06492¢	Jan. 8	18.84 Nov. 5	17.83 May 14	13.42 Dec. 10	10.33 Apr. 29
1934	2.15367¢	Apr. 24	1.95757¢	Jan. 2	17.90 May 1	16.90 Jan. 27	13.00 Mar. 13	9.50 Sept. 25
1933	1.95578¢	Oct. 3	1.75836¢	May 2	16.90 Dec. 5	13.56 Jan. 3	12.25 Aug. 8	6.75 Jan. 3
1932	1.89196¢	July 5	1.83901¢	Mar. 1	14.81 Jan. 5	13.56 Dec. 6	8.50 Jan. 12	6.43 July 5
1931	1.99626¢	Jan. 13	1.86586¢	Dec. 29	15.90 Jan. 6	14.79 Dec. 15	11.33 Jan. 6	8.50 Dec. 29
1930	2.25488¢	Jan. 7	1.97319¢	Dec. 9	18.21 Jan. 7	15.90 Dec. 16	15.00 Feb. 13	11.25 Dec. 9
1929	2.31773¢	May 28	2.26498¢	Oct. 29	18.71 May 14	18.21 Dec. 17	17.58 Jan. 29	14.08 Dec. 3

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing 78 pct of the United States output. Index recapitulated in Aug. 28, 1941, issue.

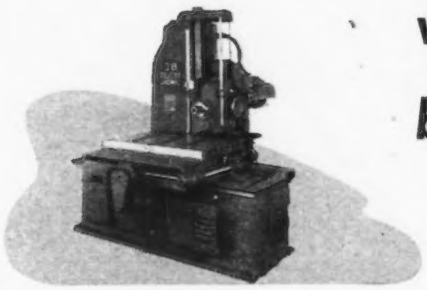
Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia, and Chicago.

Retract and Reposition Your Work

within .0002" Selected Location

by Push Button Controls!



3-B DEVLIEG JIGMIL Provides for

Minimum Tool Overhang

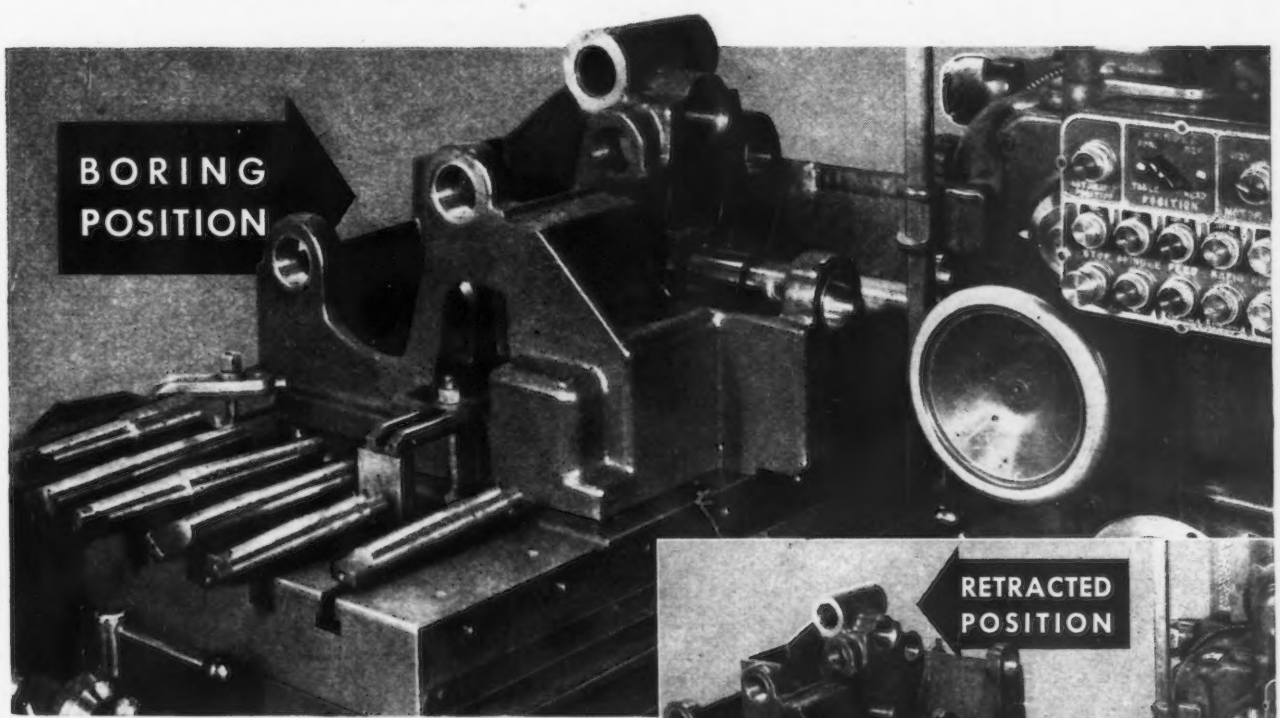
Maximum Operating Efficiency

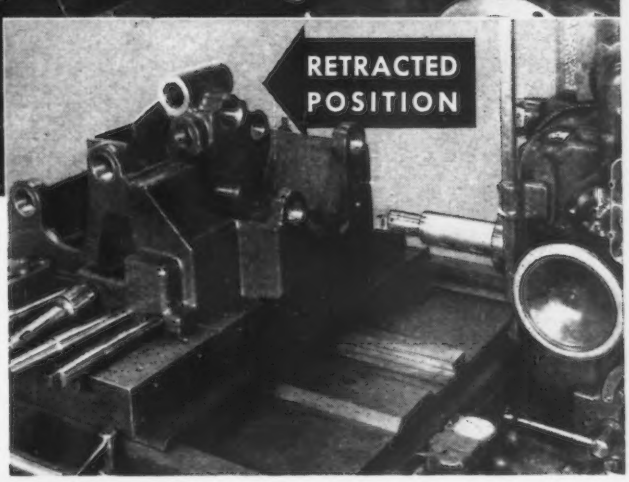
Greater *Controlled* Accuracy

You can save time, cut costs and reach new high standards of accuracy on your difficult precision jig boring and milling operations with a 3-B DeVlieg JIGMIL.

Location of work for minimum tool overhang and top performance advantage! Ready accessibility for necessary tool adjustments and changes! Convenience for checking machined dimensions! All these are served by JIGMIL's centralized push button control means which unlocks and retracts the table to open position, then automatically repositions and locks the table to within .0002" of the selected position.

In addition, JIGMIL's push button controls provide automatic hole spacing accuracy within .0001". Write today for complete descriptive and technical literature.





Here's Precision Boring at its Best!

The work piece above is an intricate casting for a three way diamond boring machine. All holes were bored on a 3-B DeVlieg JIGMIL to size, length and spacing accuracies of within .0001". Of the five castings comprising this particular job, the same high JIGMIL standard of accuracy was maintained throughout for perfect interchangeability of parts!

DeVLIEG MACHINE COMPANY DEVLIEG JIGMIL **450 FAIR AVE. FERNDALE 20, (Detroit) MICH.**

Iron and Steel Prices . . .

Steel prices shown here are f.o.b. basing points in cents per pound or dollars per gross ton. Extras apply. Delivered prices do not reflect 3 pct tax on freight. Industry practice has discontinued arbitrary f.o.b. prices at Gulf and Pacific Ports. Space limitations prevent quotation of delivered prices at major ports. (1) Commercial quality sheet grade; primes, 25¢ above base. (2) Commercial quality grade. (3) Widths up to 12-in. inclusive. (4) 0.25 carbon and less. (5) Applies to certain width and length limitations. (6) For merchant trade. (7) For straight length material only from producer to consumer. Discount of 25¢ per 100 lb to fabricators. (8) Also shafting. For quantities of 20,000 lb to 39,999 lb. (9) Carload lot in manufacturing trade. (10) This base price for annealed, bright finish wires, commercial spring wire. (11) Boxed. (12) Produced to dimensional tolerances in AISI Manual Sect. 6. (13) Billets only.

Basing Points	Pittsburgh	Chicago	Gary	Cleveland	Birmingham	Buffalo	Youngstown	Sparrows Point	Granite City	Middletown, Ohio			DELIVERED TO Detroit	New York	Philadelphia
INGOTS															
Carbon, rerolling	($35.00 f. o. b. mill)														
Carbon, forging	$40.00	$40.00	$40.00	$40.00	$40.00	$40.00	$40.00								
Alloy	$52.00	$52.00				$52.00	(Bethlehem, Massillon, Canton, Coatesville=$52.00)								
BILLETS, BLOOMS, SLABS							(Provo=$53.20, Duluth=$44.00[13])								
Carbon, rerolling	$42.00	$42.00	$42.00	$42.00	$42.00	$42.00	$42.00	$42.00					$44.50		
Carbon, forging billets	$50.00	$50.00	$50.00	$50.00	$50.00	$50.00	(Provo=$61.20, Duluth=$52.00[13]) $50.00						$52.50		
Alloy	$61.00	161.00				$61.00	(Bethlehem, Massillon, Canton=$61.00)						$63.50		
SHEET BARS							$50								
PIPE SKELP	2.35¢	2.35¢					2.35¢	2.35¢	(Coatesville=2.35¢)						
WIRE RODS	2.55¢	2.55¢		2.55¢	2.55¢		(Worcester=2.65¢)								
SHEETS															
Hot-rolled	2.50¢	2.50¢	2.50¢	2.50¢	2.50¢	2.50¢	2.50¢	2.50¢	2.875¢	2.50¢			2.635¢	2.79¢	2.70¢
Cold-rolled [1]	3.20¢	3.20¢	3.20¢	3.20¢		3.20¢	3.20¢		3.30¢				3.335¢	3.61¢	3.58¢
Galvanized (10 gage)	3.55¢	3.55¢	3.55¢		3.55¢		3.55¢	3.55¢	3.65¢					3.84¢	3.75¢
Enameling (12 gage)	3.55¢	3.55¢	3.55¢	3.55¢			3.55¢		3.65¢				3.685¢	3.95¢	3.93¢
Long ternes [2] (10 gage)	3.55¢	3.55¢	3.55¢											3.95¢	3.91¢
STRIP															
Hot-rolled [3]	2.50¢	2.50¢	2.50¢		2.50¢		2.50¢						2.635¢	2.93¢	2.83¢
Cold-rolled [4]	3.20¢	3.30¢		3.20¢			3.20¢			(Worcester=3.75¢)			3.335¢	3.61¢	3.58¢
Cooperage stock	2.80¢	2.80¢			2.80¢		2.80¢							4.09¢	
TINPLATE															
Standard cokes, base box	$5.75	$5.75	$5.75		$5.85			$5.85	$5.85		(Warren, Ohio=$5.75)		$6.157	$6.062[11]	
Electro, box { 0.25 lb	Deduct 90¢ from standard coke base box price.														
0.50 lb	Deduct 70¢ from standard coke base box price.														
0.75 lb	Deduct 50¢ from standard coke base box price.														
BLACKPLATE															
29 gage [5]	3.60¢	3.60¢	3.60¢		3.70¢			3.70¢	3.70¢		(Warren, Ohio=$5.75)		3.94¢	3.99¢	3.90¢
TERNES, MFG.															
Special coated, base box	Deduct 85¢ from standard coke base box price.														
BARS															
Carbon steel	2.60¢	2.60¢	2.60¢	2.60¢	2.60¢	2.60¢	2.60¢	(Duluth=2.70¢) (Provo, Utah=3.30¢)					2.735¢	3.01¢	2.98¢
Rail steel [6]	2.75¢	2.75¢	2.75¢	2.75¢	2.75¢	2.75¢									
Reinforcing (billet) [7]	2.45¢	2.45¢	2.45¢	2.45¢	2.45¢	2.45¢	2.45¢	2.45¢					2.79¢	2.74¢	2.65¢
Reinforcing (rail) [7]	2.60¢	2.60¢	2.60¢	2.60¢	2.60¢	2.60¢	2.60¢						2.735¢		
Cold-finished [8]	3.20¢	3.20¢	3.20¢	3.20¢		3.20¢	(Detroit=3.25¢, Toledo=3.385¢)							3.61¢	3.58¢
Alloy, hot-rolled	3.05¢	3.05¢				3.05¢	3.05¢	(Bethlehem, Massillon, Canton=3.05¢)					3.185¢		3.19¢
Alloy, cold-drawn	3.80¢	3.80¢	3.80¢	3.80¢		3.80¢							3.90¢		
PLATE								(Coatesville, Claymont=2.80¢, Geneva, Utah=2.80¢)							
Carbon steel [12]	2.65¢	2.65¢	2.65¢	2.65¢	2.65¢		2.65¢	2.65¢					2.905¢	2.87¢	2.83¢
Floor plates	3.90¢	3.90¢											4.24¢	4.30¢	4.28¢
Alloy	3.79¢	3.79¢			(Coatesville=4.10¢)									4.01¢	3.895¢
SHAPES															
Structural	2.50¢	2.50¢	2.50¢		2.50¢	2.50¢	(Geneva, Utah=2.65¢) (Bethlehem=2.50¢)						2.81¢	2.70¢	2.64¢
SPRING STEEL, C-R															
0.26 to 0.50 carbon	3.55¢			3.55¢			(Worcester=3.75¢)								
0.51 to 0.75 carbon	4.80¢			4.80¢			(Worcester=5.00¢)								
0.76 to 1.00 carbon	6.65¢			6.65¢			(Worcester=6.85¢)								
1.01 to 1.25 carbon	8.85¢			8.85¢			(Worcester=9.05¢)								
WIRE [9]															
Bright [10]	3.30¢	3.30¢		3.30¢	3.30¢		(Worcester=3.40¢, Duluth=3.35¢)						3.56¢	3.71¢	3.68¢
Galvanized	Add proper size extra and galvanizing extra to Bright Wire Base														
Spring (high carbon)	4.25¢	4.25¢		4.25¢			(Worcester=4.40¢)			(Trenton=4.50¢)			4.51¢	4.66¢	4.345¢
PILING															
Steel sheet	3.00¢	3.00¢				3.00¢								3.41¢	3.36¢

CORROSION AND HEAT RESISTANT STEELS

In cents per pound, f.o.b. basing point

BASING POINT	Chromium Nickel		Straight Chromium			
	No. 304	No. 302	No. 410	No. 430	No. 442	No. 446
Ingot, P'gh, Chi, Canton, Balt, Reading, Ft. Wayne, Phila.	Subject to negotiation			Subject to negotiation		
Blooms, P'gh, Chi, Canton, Phila, Reading, Ft. Wayne, Balt.	22.99	22.07	17.01	17.47	20.69	25.29
Slabs, P'gh, Chi, Canton, Balt, Phila, Reading	22.99	22.07	17.01	17.47	20.69	25.29
Billets, P'gh, Chi, Canton, Watervliet, Syracuse, Balt	Subject to negotiation			Subject to negotiation		
Billets, forging, P'gh, Chi, Canton, Dunkirk, Balt, Phila, Reading, Watervliet, Syracuse, Ft. Wayne, Titusville	22.99	22.07	17.01	17.47	20.69	25.29
Bars, h-r, P'gh, Chi, Canton, Dunkirk, Watervliet, Syracuse, Balt, Phila, Reading, Ft. Wayne, Titusville	27.05	25.97	20.02	20.56	24.34	29.75
Bars, c-f, P'gh, Chi, Cleve, Canton, Dunkirk, Syracuse, Balt, Phila, Reading Ft. Wayne, Watervliet	27.05	25.97	20.02	20.56	24.34	29.75
Plates, P'gh, Middletown, Canton	31.38	29.21	23.28	23.80	28.67	33.00
Shapes, structural, P'gh, Chi	27.05	25.97	20.02	20.56	24.34	29.75
Sheets, P'gh, Chi, Middletown, Canton, Balt	38.95	36.79	28.67	31.38	35.16	38.49
Strip h-r, P'gh, Chi, Reading, Canton, Youngstown	25.43	23.28	18.39	18.93	25.97	37.87
Strip, c-r, P'gh, Cleve, Newark, N. J., Reading, Canton, Youngstown	32.46	30.30	23.80	24.34	34.62	56.26
Wire, c-d, Cleve, Dunkirk, Syracuse, Balt, Reading, Canton, P'gh, Newark, N. J., Phila.	27.05	25.97	20.02	20.56	24.34	29.75
Wire, flat, c-r, Cleve, Balt, Reading, Dunkirk, Canton	32.46	30.30	23.80	24.34	34.62	56.26
Rod, h-r, Syracuse	27.05	25.97	20.02	20.56	24.34	29.75
Tubing, seamless, P'gh, Chi, Canton, (4 to 6 in.)	72.09	72.09	.....	68.49	.....	.....

TOOL STEEL

*(F.o.b. Pittsburgh, Bethlehem, Syracuse, Dunkirk. *Also Canton, O.)*

An increase of 8.2 pct applies to base price and extras

	Base per lb
High speed	67¢
Straight molybdenum	54¢
Tungsten-molybdenum	57½¢
High-carbon-chromium*	43¢
Oil hardening*	24¢
Special carbon*	22¢
Extra carbon*	18¢
Regular carbon*	14¢

Warehouse prices on and east of Mississippi are 2¢ per lb higher; west of Mississippi 3¢ higher.

ELECTRICAL SHEETS

Base, all grades f.o.b. Pittsburgh

	per lb
Field grade	3.90¢
Armature	4.25¢
Electrical	4.75¢
Motor	5.425¢
Dynamo	6.125¢
Transformer 72	6.625¢
Transformer 65	7.625¢
Transformer 58	8.125¢
Transformer 52	8.925¢

F.o.b. Chicago and Gary, field grade through motor; f.o.b. Granite City, add 10¢ per 100 lb on field grade to and including dynamo.

RAILS, TRACK SUPPLIES

(F.o.b. mill)

Standard rails, heavier than 60 lb	
No. 1 O.H., per 100 lb	$2.50
Angle splice bars, 100 lb	3.00
(F.o.b. basing points)	*per 100 lb*
Light rails (from billets)	$2.85
Light rails (from rail steel), f.o.b. Williamsport, Pa.	2.95

	Base per lb
Cut spikes	4.50¢
Screw spikes	6.40¢
Tie plate, steel	2.80¢
Tie plates, Pacific Coast	2.95¢
Track bolts	6.50¢
Track bolts, heat treated, to rail roads	6.75¢
Track bolts, jobbers discount	63-5

Basing points, light rails, Pittsburgh, Chicago, Birmingham; cut spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa., Buffalo. Cut spikes alone—Youngstown, Lebanon, Pa., Richmond, add 25¢.

ROOFING TERNEPLATE

(F.o.b. Pittsburgh, 112 sheets)

	20x14 in.	20x28 in.
8-lb coating I.C.	$6.75	$13.50

CLAD STEEL

Base prices, cents per pound

	Plate	*Sheet*
Stainless-clad		
No. 304, 20 pct, f.o.b. Pittsburgh, Washington, Coatesville, Pa.	24.00*	22.00
Nickel-clad		
10 pct, f.o.b. Coatesville, Pa.	21.50	....
Inconel-clad		
10 pct, f.o.b. Coatesville	30.00	....
Monel-clad		
10 pct, f.o.b. Coatesville	29.00	....
Aluminized steel		
Hot dip, 20 gage, f.o.b. Pittsburgh	....	9.00

*Includes annealing and pickling.

WIRE PRODUCTS

To the dealer f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham, Duluth

	Base per keg
Standard, galvanized and coated nails	$3.75†
Cut nails, carloads	5.05

†10¢ additional at Cleveland.

	Base per 100 lb
Annealed fence wire	$3.95
Annealed galv. fence wire	4.40

	Base column
Woven wire fence*	84
Fence posts, carloads	74
Single loop bale ties	86
Galvanized barbed wire**	94
Twisted barbless wire	94

*15½ gage and heavier. **On 80-rod spools in carload quantities.

HIGH TENSILE, LOW ALLOY STEELS

base prices, cents per pound

Steel	Aldecor	Corten	Double Strength No. 1	Dynalloy	HI Steel	Mayari R	Otis-coloy	Yoloy	Y-50
Producer	Republic	Carnegie-Illinois, Republic	Republic	Alan Wood	Inland	Bethle-hem	Jones & Laughlin	Youngs-town Sheet & Tube	American Rolling Mill
Plates	4.10	4.10	4.10	4.10	4.10	4.10	4.10	4.10	.....
Sheets									
Hot-rolled	3.85	3.85	3.85	3.85	3.85	3.85	3.85	3.85	.....
Cold-rolled	4.75	4.75	4.75	.....	4.75	4.75	4.75	4.75	5.225*
Galvanized	.....	5.40	.....	.....	.....	5.40	.....	.....	.....
Strip									
Hot-rolled	3.85	3.85	3.85	.....	3.85	3.85	3.85	3.85	.....
Cold-rolled	.....	.....	4.75	.....	.....	4.75	4.75	4.75	5.00*
Shapes	.....	3.85	.....	.....	3.85	3.85	3.85	3.85	.....
Beams	.....	3.85	.....	.....	.....	3.85	.....	.....	.....
Bars									
Hot-rolled	4.00	4.00	4.00	.....	.....	4.00	4.00	4.00	.....
Cold-rolled	.....	.....	.....	.....	.....	.....	.....	4.60	.....
Bar shapes	.....	4.00	.....	.....	4.00	4.00	4.00	4.00	.....

* 21 gage and lighter.

WELDED PIPE AND TUBING

Base discounts, f.o.b. Pittsburgh district and Lorain, Ohio, mills

(F.o.b. Pittsburgh only on wrought pipe) Base price—$200.00 per net ton

Steel (buttweld, standard)

	Black	Galv.
⅛-in.	55½	41
¼-in.	58½	45
1-in. to 3-in.	60½	47½

Wrought Iron (buttweld, standard)

⅛-in.	2	+20
¼-in.	11½	+10
1-in. and 1¼-in.	17	+ 2
1½-in.	22½	1½
2-in.	23	2

Steel (lapweld, standard)

2-in.	53	39½
2½-in. and 3-in.	56	42½
3½-in. to 6-in.	58	44½

Wrought Iron (lapweld)

2-in.	14½	+ 5½
2½-in. to 3½-in.	17	+ 1½
4-in.	21	4
4½-in. to 8-in.	19	2½

Steel (butt, extra strong, plain ends)

⅛-in.	54½	41½
¼-in.	58½	45½
1-in. to 3-in.	60	48

Wrought Iron (same as above)

⅛-in.	6½	+14
¼-in.	12½	+ 8
1-in. to 2-in.	22	2

Steel (lap, extra strong, plain ends)

2-in.	52	39½
2½-in and 3-in.	56	43½
3½-in. to 6-in.	59½	47

Wrought Iron (same as above)

2-in.	17½	+ 2
2½-in. to 4-in.	26	8½
4½-in. to 6-in.	22	4

Basing discounts for standard pipe and reamed and drifted pipe are for threads and couplings. For threads only, one point higher discount (lower price) applies; for plain ends, buttweld, and lapweld 3 in. and smaller, three points higher discount (lower price) applies, while for lapweld 3½ in. to 6 in., four points higher discount (lower price) applies.

BOILER TUBES

Seamless steel and lapweld commercial boiler tubes and locomotive tubes, minimum wall. Net base prices per 100 ft f.o.b. Pittsburgh, in carload lots

	Seamless Cold-Drawn	Seamless Hot-Rolled
2 in. O.D. 13 B.W.G.	$18.17	$15.29
2½ in. O.D. 12 B.W.G.	24.43	20.57
3 in. O.D. 12 B.W.G.	27.18	22.87
3½ in. O.D. 11 B.W.G.	34.30	28.86
4 in. O.D. 10 B.W.G.	42.55	35.82

(Extras for less carload quantities)

40,000 lb or ft and over	Base
30,000 lb or ft to 39,999 lb or ft	5 pct
20,000 lb or ft to 29,999 lb or ft	10 pct
10,000 lb or ft to 19,999 lb or ft	20 pct
5,000 lb or ft to 9,999 lb or ft	30 pct
2,000 lb or ft to 4,999 lb or ft	45 pct
Under 2,000 lb or ft	65 pct

CAST IRON WATER PIPE

	Per net ton
6-in. to 24-in., del'd Chicago	$74.33
6-in. to 24-in., del'd New York	73.60
6-in. to 24-in., Birmingham	65.00
6-in. and larger, f.o.b. cars, San Francisco, Los Angeles or Seattle for all rail shipment; rail and water shipment less	33.40

Class "A" and gas pipe, $5 extra; 4-in. pipe is $5 a ton above 6-in.

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Machine and Carriage Bolts

Base discount less case lots

	Percent Off List
½ in. & smaller x 6 in. & shorter	55
9/16 & ⅝ in. x 6 in. & shorter	52
¾ to 1 in. x 6 in. & shorter	49
1⅛ in. and larger, all lengths	49
All diameters over 6 in. long	49
Lag, all sizes	50
Plow bolts	57

Nuts, Cold Punched or Hot Pressed

(Hexagon or Square)

½ in. and smaller	50
9/16 to 1 in. inclusive	49
1⅛ to 1½ in. inclusive	48
1⅝ in. and larger	46

On above bolts and nuts, excepting plow bolts, additional allowance of 15 pct for full container quantities. There is an additional 5 pct allowance for carload shipments.

Semifin. Hexagon Nuts	U.S.S.	S.A.E.
Base discount less case lots		
7/16 in. and smaller	..	51
½ in. and smaller	50	..
½ in. through 1 in.	..	49
9/16 in. through 1 in.	49	..
1⅛ in. through 1½ in.	48	47
1⅝ in. and larger	46	..

In full case lots, 15 pct additional discount. For 200 lb or more, freight allowed up to 50¢ per 100 lb, based on Cleveland, Chicago, Pittsburgh.

Stove Bolts

	Consumer
Packages, nuts loose	60 and 10
In packages, nuts attached	67 and 52
In bulk	74

On stove bolts freight allowed up to 65¢ per 100 lb based on Cleveland, Chicago, New York on lots of 200 lb or over.

Large Rivets

(½ in. and larger)

	Base per 100 Lb
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	$5.25
F.o.b. Lebanon, Pa.	5.40

Small Rivets

(7/16 in. and smaller)

	Percent Off List
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	55 and 5

Cap and Set Screws *(In packages)*	*Percent Off List* *Consumer*
Upset full fin, hexagon head cap screws, coarse or fine thread, up to and incl. 1 in x 6 in.	59
Upset set screws, cup and oval points	71
Milled studs	46
Flat head cap screws, listed sizes	36
Fillister head cap, listed sizes	51

Freight allowed up to 65¢ per 100 lb based on Cleveland, Chicago or New York on lots of 200 lb or over.

FLUORSPAR

Maximum price f.o.b. consumer's plant, $30 per short ton plus either (1) rail freight from producer to consumer, or (2) rail freight from Rosiclare, Ill., to consumer, whichever is lower.

Effective CaF_2 Content:	Base price per short ton
70% or more	$33.00
65% but less than 70%	32.00
60% but less than 65%	31.00
Less than 60%	30.00

LAKE SUPERIOR ORES

(51.50% Fe, Natural Content, Delivered Lower Lake Ports)

	Per Gross Ton
Old range, bessemer	$5.45
Old range, non-bessemer	5.30
Mesabi, bessemer	5.20
Mesabi, non-bessemer	5.05
High phosphorus	5.05

Iron ore exempt from price control by SO 193 effective Nov. 10, 1946.

METAL POWDERS

Prices in cents per pound in ton lots, f.o.b. shipping point.

Brass, minus 100 mesh	23¢ to 27¢
Copper, electrolytic, 100 and 375 mesh	28⅝¢ to 30⅝¢
Copper, reduced, 150 and 200 mesh	22⅜¢
Iron, commercial, 100, 200, 325, mesh 96 + % Fe	11¢ to 16¢
Swedish sponge iron, 100 mesh, c.l.f. N. Y., carlots, ocean bags	7.4¢ to 8¢
Iron, crushed, 200 mesh and finer, 90 + % Fe carload lots	5¢
Iron, hydrogen reduced, 300 mesh and finer, 98 + % Fe, drum lots	66¢
Iron, electrolytic, unannealed, 325 mesh and coarser, 99 + % Fe	25¢ to 31¢
Iron, electrolytic, annealed minus 100 mesh, 99 + % Fe	17¢
Iron carbonyl, 300 mesh and finer, 98-99.8 + % Fe	90¢ to $1.75
Aluminum, 100, 200 mesh, carlots	25¢
Antimony, 100 mesh	39¢
Cadmium, 100 mesh	$2.00
Chromium, 100 mesh and finer	$1.25
Lead, 100, 200 & 300 mesh	17.55¢ to 21.05¢
Manganese, minus 325 mesh and coarser	44¢ to 61¢
Nickel, 150 mesh	51⅛¢
Silicon, minus 325 mesh and coarser	26¢ to 55¢
Solder powder, 100 mesh	8½¢ plus metal
Tin, 100 mesh	58¾¢
Tungsten metal powder, 98%-99%, any quantity, per lb	$2.60
Molybdenum powder, 99%, in 100-lb kegs, f.o.b. York, Pa., per lb	$2.65
Under 100 lb	$2.90

COKE

	Net Ton
Furnace, beehive (f.o.b. oven)	
Connellsville, Pa.	$8.75
Connellsville, Pa., hand drawn	9.35
Foundry, beehive (f.o.b. oven)	
Connellsville, Pa.	8.50
Foundry, Byproduct	
Chicago, del'd	15.10
Chicago, f.o.b.	14.35
New England, del'd	16.04
Kearny, N. J., f.o.b.	14.40
Philadelphia, del'd	14.62
Buffalo, del'd	14.75
Portsmouth, Ohio, f.o.b.	12.85
Painesville, Ohio, f.o.b.	13.50
Erie, del'd	14.50
Cleveland, del'd	14.55
Cincinnati, del'd	14.60
St. Louis, del'd	15.10†
Birmingham, del'd	12.25

†Except producers situated in states other than Missouri, Alabama or Tennessee, sellers may charge a maximum delivered price of $15.60 in the St. Louis Mo., and East St. Louis, Ill., switching districts.

REFRACTORIES

(F.o.b. Works)

Fire Clay Brick

	Carloads Per 1000
Sec. quality, Ohio	57.00
First quality, Pa., Md., Ky., Mo., Ill., Ohio	65.00
First quality, New Jersey	70.00
Sec. quality, Pa., Md., Ky., Mo., Ill.	59.00
Sec. quality, New Jersey	62.00
Sec. quality, Ohio	57.00
Ground fire clay, net ton, bulk	9.50

Silica Brick

Pennsylvania and Birmingham	$65.00
Chicago District	74.00
Silica cement, net ton (Eastern)	11.50
Chicago	12.50

Chrome Brick	*Per Net Ton*
Standard chemically bonded, Balt., Plymouth Meeting, Chester	$54.00

Magnesite Brick

Standard, Balt. and Chester	$76.00
Chemically bonded, Baltimore	65.00

Grain Magnesite

Domestic, f.o.b. Balt. and Chester in sacks	$44.50
Domestic, f.o.b. Chewelah, Wash., in bulk	22.00
in sacks	26.00
Clinker (dead burned) dolomite, bulk, per net ton, f.o.b. York, Pa.	10.05
Midwest, add 10¢; Mo. Valley, add 20¢	

WAREHOUSE PRICES

Delivered metropolitan areas, per 100 lb. Prices do not reflect recent price increases or the ICC approved freight rate increases effective Jan. 1.

Cities	SHEETS			STRIP			Plates ¼ in. and heavier	Structural Shapes	BARS		ALLOY BARS			
				Hot-Rolled										
	Hot-Rolled (10 gage)	Cold-Rolled	Galvanized (24 gage)	6 in. and Under	Over 6 in.	Cold-Rolled			Hot-Rolled	Cold-Finished	Hot-Rolled, A-8617-20	Hot-Rolled, A-8742-50 Ann.	Cold-Drawn, A-8617-20	Cold-Drawn, A-8742-50 Ann.
**Philadelphia	$3.774	$5.139	$5.249[a]	$4.314	$4.214	$5.064	$3.875	$3.937	$4.114	$4.564	$6.287	$7.387	$7.664	$8.764
New York	3.856	4.869	5.501	4.375	4.275	5.075	4.049	4.038	4.134	4.584	6.338	7.438	7.684	8.784
Boston	4.05	5.031	5.725	4.518	4.418	4.985	4.203	4.023	4.358	4.858	6.503	7.603	7.758	8.856
Baltimore	3.64	5.118	5.365	4.293	4.193	....	3.865	4.05	4.093	4.543	....	....	....	....
Norfolk	4.037	....	5.862	4.577	4.477	....	4.262	4.303	4.377	4.677	....	....	....	....
Chicago	3.475	4.425	5.40	3.95	3.85	4.90[5]	3.80	....	3.75	4.20	6.05	7.15	7.20	8.30
Milwaukee	3.633	4.583	5.558	4.108	4.008	5.058[5]	3.958	3.958	3.908	4.358	6.308	7.408	7.458	8.558
Cleveland	3.575	....	5.347	3.95	3.85	....	3.65	3.88	3.60	4.20	6.277	7.377	7.20	8.30
Buffalo	3.575	4.625	5.20	4.211	4.111	4.961	3.921	3.65	3.60	4.20	6.05	7.15	7.20	8.30
Detroit	3.71	4.76	5.526	4.085	3.985	4.95	3.935	3.987	3.735	4.285	6.456	7.556	7.585	8.685
Cincinnati	3.671	4.721	5.296	4.046	3.946	5.002	3.952	3.983	3.902	4.502	6.441	7.541	7.602	8.702
St. Louis	3.643	4.593	5.622	4.118	4.018	5.222	3.968	3.968	3.918	4.522	6.472	7.572	7.622	8.722
Pittsburgh	3.575	4.625	5.20	3.95	3.85	4.70	3.65	3.65	3.60	4.20	6.05	7.15	7.20	8.30
St. Paul	3.817	4.767	5.666	4.292	4.192	5.000	4.142	4.142	4.092	4.852	....	6.322	7.952	8.052
Duluth	3.817	4.767	5.666	4.292	4.192	....	4.142	4.142	4.092	....	6.472	6.572	....	....
Omaha	4.045	5.72	6.00	4.52	4.42	....	4.37	4.37	4.32	4.945	....	....	....	....
Indianapolis	3.775	4.825	5.40	4.15	4.05	5.03	3.92	3.92	3.87	4.47	6.17	....	7.32	....
Birmingham	3.675	....	5.20	4.05	3.95	....	3.80	3.80	3.75	4.954	6.414	7.514	7.564	8.614
Memphis	4.221	....	5.746	4.596	4.496	....	4.348	4.348	4.296	4.821	....	....	....	....
New Orleans	4.359[*]	5.40[1]	5.884	4.734	4.634	....	4.484	4.484[*]	4.434[*]	5.175	....	....	....	....
Los Angeles	4.885	6.635[1]	6.585	5.335	5.235	....	4.835	4.735	4.685	6.065	....	....	....	....
San Francisco	4.435	6.035	6.585	4.885	4.785	....	4.535	4.385	4.435	5.815	....	....	....	....
Seattle	4.905[4]	7.305[2]	6.435	4.635	4.535	....	5.035[4]	4.735[4]	4.635[4]	6.265	7.735[6]	8.735[6]	....	9.585[6]
Portland	4.905[3]	....	6.235	5.135	....	....	5.035[3]	4.735[3]	4.735[3]	6.015	7.735	8.885	....	....
Salt Lake City	4.81	....	6.70	5.94	5.84	....	5.29	5.29	5.19	6.49	....	....	....	....

BASE QUANTITIES

Standard unless otherwise keyed on prices.

HOT-ROLLED: Sheets, strip, plates, shapes and bars, 400 to 1999 lb.

COLD-ROLLED: Sheets, 400 to 1999 lb; strip, extras on all quantities; bars, 1500 lb base.

ALLOY BARS: 1000 to 39,999 lb.

GALVANIZED SHEETS: 450 to 1499 lb.

EXCEPTIONS: (1) 400 to 1499 lb; (2) 450 to 1499 lb; (3) 300 to 4999 lb; (4) 300 to 10,000 lb; (5) 2000 lb and over; (6) 1000 lb and over.

(*) Philadelphia: Galvanized sheet, 25 or more bundles.

* Add 29.1¢ for sizes not rolled in Birmingham.

** City of Philadelphia only. Applicable freight rates must be added to basing point prices to obtain delivered price to other localities in metropolitan area.

PIG IRON PRICES

Dollars per gross ton. Delivered prices represent minimums.

BASING POINT PRICES						DELIVERED PRICES† (BASE GRADES)							
Basing Point	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.	Consuming Point	Basing Point	Freight Rate	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.
Bethlehem	31.00	31.50	32.00	32.50	.....	Boston	Everett	$0.50 Arb.	29.50	30.00	30.50	31.00	.....
Birdsboro	31.00	31.50	32.00	32.50	36.00	Boston	Birdsboro-Steelton	4.82	....	....	....	....	40.82
Birmingham	28.38	28.88	....	....	.....	Brooklyn	Bethlehem	3.00	34.00	34.50	35.00	35.50	.....
Buffalo	30.00	30.50	31.00	31.50	.....	Brooklyn	Birdsboro	3.50	....	....	....	....	39.50
Chicago	30.00	30.50	30.50	31.00	.....	Canton	Clev., Ygstn., Sharpsville	1.67	31.67	32.17	32.17	32.67	.....
Cleveland	30.00	30.50	30.50	31.00	.....	Cincinnati	Birmingham	4.87	31.25	31.75	....	....	.....
Detroit	30.00	30.50	30.50	31.00	.....	Jersey City	Bethlehem	1.84	32.84	33.34	33.84	34.34	.....
Duluth	30.50	31.00	31.00	31.50	.....	Jersey City	Birdsboro	2.33	....	....	....	....	38.33
Erie	30.00	30.50	31.00	31.50	.....	Los Angeles	Provo	5.94	35.94	36.44	....	....	.....
Everett	29.00	29.50	30.00	30.50	.....	Mansfield	Cleveland-Toledo	2.33	32.33	32.83	32.83	33.33	.....
Granite City	30.00	30.50	30.50	31.00	.....	Philadelphia	Swedeland	1.01	32.01	32.51	33.01	33.51	.....
Neville Island	30.00	30.50	30.50	31.00	.....	Philadelphia	Birdsboro	1.49	....	....	....	....	37.49
Provo	30.00	30.50	....	....	.....	San Francisco	Provo	5.94	35.94	36.44	....	....	.....
Sharpsville	30.00	30.50	30.50	31.00	.....	Seattle	Provo	5.94	35.94	36.44	....	....	.....
Steelton	31.00	31.50	32.00	32.50	36.00	St. Louis	Granite City	0.75 Arb.	30.75	31.25	31.25	31.75	.....
Swedeland	31.00	31.50	32.00	32.50	.....								
Toledo	30.00	30.50	30.50	31.00	.....								
Youngstown[1]	30.00	30.50	30.50	31.00	.....								

(1) Struthers Iron & Steel Co., Struthers, Ohio, charges 50¢ per ton in excess of basing point prices for No. 2 foundry, basic, bessemer and malleable.

Charcoal pig iron base price for low phosphorous $37.50 per gross ton, f.o.b. Lyles, Tenn. Delivered to Chicago, $42.99. High phosphorous charcoal pig iron is not being produced.

Basing point prices are subject to switching charges; silicon differentials (not to exceed 50¢ per ton for each 0.25 pct silicon content in excess of base grade which is 1.75 to 2.25 pct); phosphorus differentials, a reduction of 38¢ per ton for phosphorus content of 0.70 pct and over; manganese differentials, a charge not to exceed 50¢ per ton for each 0.50 pct manganese content in excess of 1.00 pct. $2 per ton extra may be charged for 0.5 to 0.75 pct nickel content and $1 per ton extra for each additional 0.25 pct nickel.

Silvery iron silicon 6.00 to 6.50 pct, C/L per g.t., f.o.b. Jackson Ohio—$36.00; f.o.b. Buffalo—$37.25. Add $1.00 per ton for each additional 0.50 pct Si. Add 50¢ per ton for each 0.50 pct Mn over 1.00 pct. Add $1.00 per ton for 0.75 pct or more P. Bessemer ferrosilicon prices are $1.00 per ton above silvery iron prices of comparable analysis.

FERROALLOY PRICES

Ferromanganese

78-82% Mn, maximum contract base price, gross ton, lump size, f.o.b. Baltimore, Philadelphia, New York, Birmingham, Rockdale, Rockwood, Tenn.

Carload lots (bulk)	$135.00
Less ton lots (packed)	148.50
F.o.b. Pittsburgh	139.50

$1.70 for each 1% above 82% Mn; penalty, $1.70 for each 1% below 78%.

Briquets—cents per pound of briquet, freight allowed, 66% contained Mn.

	Eastern	Central	Western
Carload, bulk	6.40	6.65	7.20
Ton lots	7.30	7.90	9.80
Less ton lots	7.70	8.30	10.20

Spiegeleisen

Contract prices, gross ton, lump, f.o.b. Palmerton, Pa.

	16-19% Mn 3% max. Si	19-21% Mn 3% max. Si
Carloads	$39.00	$40.00
F.o.b. Pittsburgh, Chicago	44.00	

Manganese Metal

Contract basis, 2 in. x down, cents per pound of metal, f.o.b. shipping point, freight allowed, eastern zone.

96% min. Mn, 0.2% max. C, 1% max. Si, 2% max. Fe.

Carload, bulk	30
L.c.l. lots	32

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, cents per pound.

Carloads	32
Ton lots	34
Less ton lots	36

Low-Carbon Ferromanganese

Contract price, cents per pound Mn contained, lump size, f.o.b. shipping point, freight allowed, eastern zone.

	Carloads	Ton	Less
0.10% max. C, 0.06% P, 90% Mn	21.00	21.40	21.65
0.10% max. C	20.50	20.90	21.15
0.15% max. C	20.00	20.40	20.65
0.30% max. C	19.50	19.90	20.15
0.50% max. C	19.00	19.40	19.65
0.75% max. C, 7.00% max. Si	16.00	16.40	16.65

Silicomanganese

Contract basis, lump size, cents per pound of metal, f.o.b. shipping point, freight allowed. 65-70% Mn, 17-20% Si, 1.5% max. C.

Carload, bulk	6.45
Ton lots	7.40
Briquet, contract basis, carlots, bulk freight allowed, per lb of briquet	6.15
Ton lots	7.05
Less ton lots	7.45

Silvery Iron (electric furnace)

Si 14.01 to 14.50%, $53.25 f.o.b. Keokuk, Iowa; $50.00 f.o.b. Jackson, Ohio; $51.25 f.o.b. Niagara Falls. Add $1.00 per ton for each additional 0.50% Si up to and including 18%. Add $1.00 per ton for low impurities, not to exceed: P—0.05%, S—0.04%, C—1.00%.

Silicon Metal

Contract price, cents per pound contained Si, lump size, f.o.b. shipping point, freight allowed, for ton lots packed.

	Eastern	Central	Western
96% Si, 2% Fe	14.65	16.90	18.65
97% Si, 1% Fe	15.05	17.30	19.05

Ferrosilicon Briquets

Contract price, cents per pound of briquet, bulk, f.o.b. shipping point, freight allowed to destination, 40% Si. 1 lb briquets.

	Eastern	Central	Western
Carload, bulk	3.85	4.10	4.30
Ton lots	4.75	5.35	5.65
Less ton lots	5.15	5.75	6.05

Electric Ferrosilicon

Contract price, cents per pound contained Si, lump size in carloads, f.o.b. shipping point, freight allowed.

	Eastern	Central	Western
50% Si	7.45	7.95	8.15
75% Si	9.25	9.55	10.30
80-90% Si	10.45	10.75	11.50
90-95% Si	12.05	12.35	13.05

Ferrochrome (65-72% Cr, 2% max. Si)

Contract prices, cents per pound, contained Cr, lump size in carloads, f.o.b. shipping point, freight allowed.

	Eastern	Central	Western
0.06% C	23.00	23.40	24.00
0.10% C	22.50	22.90	23.50
0.15% C	22.00	22.40	23.00
0.20% C	21.50	21.90	22.50
0.50% C	21.00	21.40	22.00
1.00% C	20.50	20.90	21.50
2.00% C	19.50	19.90	20.50
65-69% Cr, 4-9% C	15.60	16.00	16.15
62-66% Cr, 4-6% C, 6-9% Si	16.60	17.00	17.15

Briquets—contract price, cents per pound of briquet, f.o.b. shipping point, freight allowed, 60% chromium.

	Eastern	Central	Western
Carload, bulk	9.85	10.10	10.20
Ton lots	10.75	11.65	12.25
Less ton lots	11.15	12.05	12.65

High-Nitrogen Ferrochrome

Low-carbon type: 67-72% Cr, 0.75% N. Add 2¢ per lb to regular low carbon ferrochrome price schedule. Add 2¢ for each additional 0.25% N.

S. M. Ferrochrome

Contract price, cents per pound chromium contained, lump size, f.o.b. shipping point, freight allowed.

High carbon type: 60-65% Cr, 4-6% Si, 4-6% Mn, 4-6% C.

	Eastern	Central	Western
Carload	16.70	17.10	17.25
Ton lots	17.90	19.20	20.00
Less ton lots	18.60	19.90	20.70

Low carbon type: 62-66% Cr, 4-6% Si, 4-6% Mn, 1.25% max. C.

	Eastern	Central	Western
Carload	20.00	20.40	21.00
Ton lots	21.00	21.65	22.85
Less ton lots	22.00	22.65	23.85

Chromium Metal

Contract prices, cents per lb, chromium contained, carload, f.o.b. shipping point, freight allowed. 97% min. Cr, 1% max. Fe.

	Eastern	Central	Western
0.20% max. C	83.50	85.00	86.25
0.50% max. C	79.50	81.00	82.25
9.00% min. C	79.50	81.00	82.25

Calcium—Silicon

Contract price per lb of alloy, lump, f.o.b. shipping point, freight allowed.

30-35% Ca, 60-65% Si, 3.00% max. Fe or 28-32% Ca, 60-65% Si, 6.00% max. Fe.

	Eastern	Central	Western
Carloads	13.00	13.50	15.55
Ton lots	14.50	15.25	17.40
Less ton lots	15.50	16.25	18.40

Calcium—Manganese—Silicon

Contract prices, cents per lb of alloy, lump, f.o.b. shipping point, freight allowed.

16-20% Ca, 14-18% Mn, 53-59% Si.

	Eastern	Central	Western
Carloads	15.50	16.00	18.05
Ton lots	16.50	17.35	19.10
Less ton lots	17.00	17.85	19.60

Calcium Metal

Eastern zone contract prices, cents per pound of metal, f.o.b. shipping point, freight allowed. Add 1.5¢ for central zone: 3.5¢ for western zone.

	Cast	Turnings	Distilled
Ton lots	$1.60	$2.35	$2.95
Less ton lots	1.95	2.70	3.75

CMSZ

Contract price, cents per pound of alloy, f.o.b. shipping point, freight allowed.

Alloy 4: 45-49% Cr, 4-6% Mn, 18-21% Si, 1.25-1.75% Zr, 3.00-4.5% C.

	Eastern	Central	Western
Ton lots	13.50	14.60	16.55
Less ton lots	14.25	15.35	17.30

Alloy 5: 50-56% Cr, 4-6% Mn, 13.50-16.00% Si, 0.75 to 1.25% Zr, 3.50-5.00% C.

	Eastern	Central	Western
Ton lots	13.25	14.35	16.30
Less ton lots	14.00	15.10	17.05

SMZ

Contract price, cents per pound of alloy, f.o.b. shipping point, freight allowed. 60-65% Si, 5-7% Mn, 5-7% Zr, 20% Fe.

	Eastern	Central	Western
Ton lots	13.25	14.35	16.30
Less ton lots	14.00	15.10	17.05

Other Ferroalloys

Ferrotungsten, standard, lump or ¼ X down, packed, f.o.b. plant Niagara Falls, Washington, Pa., York, Pa., per pound contained T, 5 ton lots, freight allowed	$1.88
Ferrovanadium, 35-55%, contract basis, f.o.b. plant, freight allowances, per pound contained V.	
Openhearth	$2.70
Crucible	$2.80
High speed steel (Primos)	$2.90
Vanadium pentoxide, 88-92% V_2O_5 technical grade, contract basis, per pound contained V_2O_5	$1.10
Ferrocolumbium, 50-60%, contract basis, f.o.b. plant, freight allowed, per pound contained Cb.	
Ton lots	$2.50
Less ton lots	$2.55
Ferromolybdenum, 55-75%, f.o.b. Langeloth, Washington, Pa., per pound contained Mo	95¢
Calcium molybdate, 40-45%, f.o.b. Langeloth, Washington, Pa., per pound contained Mo	80¢
Molybdenum oxide briquets, 48-52% Mo, f.o.b. Langeloth, Pa., per pound contained Mo	80¢
Molybdenum oxide, in cans, f.o.b. Langeloth and Washington, Pa., per pound contained Mo	80¢
Ferrotitanium, 40-45%, 0.10%C max., f.o.b. Niagara Falls, N. Y., ton lots, per pound contained Ti	$1.23
Less ton lots	$1.25
Ferrotitanium, 20-25%, 0.10%C max., ton lots, per pound contained Ti	$1.35
Less ton lots	$1.40
High carbon ferrotitanium, 15-20%, 6-8% C, contract basis, f.o.b. Niagara Falls, freight allowed, carloads, per net ton	$142.50
Ferrophosphorus, 18%, electric or blast furnaces, f.o.b. Anniston, Ala., carlots, with $3 unitage freight equalled with Rockdale, Tenn., per gross ton	$58.50
Ferrophosphorus, Electrolytic, 23-26%, carlots, f.o.b. Monsanto (Siglo), Tenn., $3 unitage freight equalized with Nashville, per gross ton	$75.00
Zirconium, 35-40%, contract basis, f.o.b. plant, freight allowed, per pound of alloy.	
Carload lots	14.50¢
Zirconium, 12-15%, contract basis, lump, f.o.b. plant, freight allowed, per pound of alloy	
Carload, bulk	4.85¢
Alsifer, 20% Al, 40% Si, 40% Fe, contract basis, f.o.b. Niagara Falls, carload	6.25¢
Ton lots	6.75¢
Simanal, 20% Si, 20% Mn, 20% Al, contract basis, f.o.b. Philo, Ohio, freight allowed, per pound	
Car lots	8.50¢
Ton lots	9.25¢
Less ton lots	9.75¢

Boron Agents

Contract prices per pound of alloy, f.o.b. shipping point, freight allowed. Ferroboron, 17.50% min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C.

	Eastern	Central	Western
Less ton lots	$1.30	$1.3075	$1.329

Manganese—Boron 75.00% Mn, 15-20% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C.

Ton lots	$1.89	$1.903	$1.935
Less ton lots	2.01	2.023	2.055

Nickel—Boron 15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni.

Less ton lots	$2.10	$2.1125	$2.1445

Silcaz, contract basis, f.o.b. plant freight allowed, per pound of alloy.

Carload lots	35¢
Ton lots	37¢

Grainal, f.o.b. Bridgeville, Pa., freight allowed, 50 lb and over.

No. 1	87.5¢
No. 6	60¢
No. 79	45¢

Bortram, f.o.b. Niagara Falls

Ton lots, per pound	45¢
Less ton lots, per pound	50¢

(CONTINUED FROM PAGE 68)

ganese Bronze Co., Rhawn & Torresdale Ave., Philadelphia.

Hytemco: Nickel alloy with 30 Fe, for emersion heaters, heat pads, electrical resistances. Driver-Harris Co., Harrison, N. J.

Hytempite: Air-setting, high-temperature, plastic cement for bonding fire brick, with thin, strong, air-and-gas-tight joints. Quigley Co., Inc., 527 Fifth Ave., New York 17.

Hytensil Casting Alloy: Strong aluminum alloy for use, particularly in castings, without heat treatment, for aircraft castings and to replace forgings, extrusions, etc. Hytensil Aluminum Co., 5811 W. 66th St., Chicago.

Hy-Test: Safety shoes with steel box toes. International Shoe Co., 1509 Washington Ave., St. Louis 3.

Hytork: Synchronous motors. Allis-Chalmers Mfg. Co., Milwaukee 1.

I

I G E: Graphite shapes for centrifugal casting, rods for risers, plugs for ingot molds, electrodes for electrothermic and electrolytic purposes. International Graphite and Electric Corp., Saint Marys, Pa.

I & L: Flexible couplings, gears, etc. Foote Bros. Gear and Machine Corp., 4547 S. Western Blvd., Chicago 9.

Ia-Ia: 59-40 copper nickel with Fe-Mn; for resistances and thermocouples. H. Boker & Co., Inc., Duane St. & Broadway, New York 8.

I-Beam-Lok: Extra-strong but lightweight steel grid flooring for bridges, ramps, and building construction; open or concrete filled (armored) types. Carnegie-Illinois Steel Corp., Carnegie Bldg., Pittsburgh 30.

Ideal: Electric-furnace die, bearing, ordnance and aircraft steels. National Supply Co., Torrance, Calif.

Ideal: Elevator door hardware. Richards-Wilcox Mfg. Co., Aurora, Ill.

Ideal: End and corner posts; roofing; nails; U-shape steel fence posts. American Steel & Wire Co., Rockefeller Bldg., Cleveland 13.

Ideal: Speed lathes for polishing, deburring, filing, etc., metal and plastic parts. Schauer Machine Co., 2060 Reading Rd., Cincinnati 2.

Ideal Elalco: Heat-resistant copper-nickel alloy with Fe-Mn, for electrical resistances and heating elements. Driver-Harris Co., Harrison, N. J.

Ideco Building Sheet: Deep-ribbed galvanized sheeting of high structural strength for steel buildings; also used for roofing and decking. International Derrick & Equipment Co., 875 Michigan Ave., Columbus 8, Ohio.

Ifsco: Core oils for foundry use. Independent Foundry Supply Co., 2325 E. 38th St., Los Angeles 11.

Igedur: Duralumin-type Cu-Si-Mn-Mg aluminum alloy for light-alloy parts. I. G. Farbenindustrie, Frankfurt a.M., Germany.

Ignitron: Rectifier, a.c. to d.c. Westinghouse Electric Corp., E. Pittsburgh.

Ihrigizing: Silicon impregnation of steel to impart surface wear and corrosion resistance. Globe Steel Tubes Co., 3800 W. Burnham St., Milwaukee.

Illium: Heat and corrosion-resistant nickel-base alloy used in combating the corrosion of acids and various chemicals. Burgess-Parr Co., Freeport, Ill.

Illium G: Ni-Cr-Cu-Mo alloy for chemical apparatus, pump and valve parts. Burgess-Parr Co., Foot of Exchange St., Freeport, Ill.

Immaculate: 18 Cr, 8 Ni, 4 W stainless steel for heat and scale resistance in valves, turbine blades, furnace parts. Firth-Vickers Stainless Steels, Ltd., Sheffield, England.

Immaculate: Series of nickel-chrome stainless steels for resisting atmospheric corrosion, high temperatures and chemicals. English Steel Corp., Ltd., Sheffield, England.

Immadium: Corrosion and wear-resistant copper alloy for stay bolts, pump rods, shafts. Manganese Bronze & Brass Co., Ltd., London, England.

Impacto: Mn-Mo-Ni steel for case-hardened parts. Canadian Atlas Steels, Ltd., Welland, Ontario, Canada.

Imperial: A variety of stainless steels. Edgar Allen & Co., Ltd., Sheffield 9, England.

Imperial: 80-20 copper-nickel alloy for condenser tubes. Empire Metal Co., E. Water & Fullerton Sts., Syracuse, N. Y.

Imperial Bronze: Insect screen cloth made from hard drawn commercial bronze. John A. Roebling's Sons Co., Trenton 2, N. J.

Imperial Stainless: Chrome stainless steels for knives, cutlery, ball races, heat exchangers and chemical applications. Edgar Allen Steel Co., Inc., 743 Washington St., New York.

Imphy: Nickel steels containing between 2-7 Ni for case-hardened parts, crankshafts, transmissions. Soc. Anon. de Commentry Fourchambault et Decazeville, Paris, France; R. Y. Ferner Co., Investment Bldg., Washington.

Imphysta: Steel for airplane construction. Soc. Anon. de Commentry, Fourchambault et Decazeville, Paris, France; R. Y. Ferner Co., Investment Bldg., Washington.

Improvite: Master alloy of 67 Ni, 30 Cu, Si to introduce Ni and Cu into cast iron. H. Kramer & Co., 1343 W. 21 St., Chicago.

Inalium: Aluminum alloy with Mg-Si and 1.75 cadmium, for light-alloy parts. Comp. des Alliages Speciaux d'aluminium, Asnieres, France.

In-Cel-Ate: Firebrick. Mexico Refractories Co., Mexico, Mo.

Inco: Nickel with 33.7 Cu, 3.3 Fe, 0.5 Mn, 3.8 Si for castings to resist steam erosion. International Nickel Co., Inc., 67 Wall St., New York.

Incomparable: Four-Jaw independent chucks with patented type of thrust bearing. Cushman Chuck Co., Hartford.

Inconel: Corrosion-resistant alloy for high temperature service, analyzing 79.5 pct Ni, 13 Cr, and 6.5 Fe. International Nickel Co., Inc., 67 Wall St., New York 5.

Inconel-Clad: Steel sheets clad with 10 pct Inconel, for corrosion resistant parts. Lukens Steel Co., Coatesville, Pa.

Indco: Case-hardening steel for broaches, knitting machines, automobile parts. Industrial Steels, Ltd., Sheffield, England.

India Oil Stone: Oilstones and oilstone wheels. Norton Co., Worcester 6.

Indian Brand: Manganese steel castings for heavy-duty crushers, excavating machinery, etc. Frog Switch & Mfg. Co., Carlisle, Pa.

Indian Brand: Metal polishing abrasives. Hamilton Emery & Corundum Co., Chester, Mass.

Indian Head: Refractory products. North American Refractories Co., 1012 National City Bank Bldg., Cleveland 14.

Indium: Bearings on which indium is diffused to protect surfaces and permit of heavy loading under relatively high temperatures; also electroplated on other metals to replace cadmium and zinc plating. Indium Corp. of America, 60 E. 42 St., New York 17.

Indium Fluoborate: A high-speed acid indium electroplating solution. General Chemical Co., 40 Rector St., New York 6.

Indus: Series of case-hardening steels with Ni, Cr for cams, gears, crown wheels, bolts, heavy gears. Industrial Steels, Ltd., Sheffield, England.

Industrex: Industrial radiograph film. Kodak, Ltd., Kingsway, London, W. C. 2, England.

Industrial: Complete series of stainless steels for general anti-corrosion and heat resistant applications. Industrial Steels, Inc., 250 Bent St., Cambridge, Mass.

Infrax: Kaolin-base, lightweight insulating firebrick for use at elevated temperatures. Carborundum Co., Refractories Div., Perth Amboy, N. J.

Infray: Paints, varnishes, enamels, lacquers, etc., especially formulated for infra-red baking. Pinchin Johnson & Co. Ltd., Witley Court, Witley, Surrey.

Ingaclad: Series of stainless, heat and corrosion-resistant clad steels with Cr-Ni, Mn, Mo, Ni; for corrosion-resistant parts. Ingersoll Steel & Disc Co., 310 S. Michigan Ave., Chicago.

Ingersall: Stainless steels. Ingersoll Steel & Disc Co., 310 S. Michigan Ave., Chicago.

Instrumaster: Isometric and dimetric stencils for pictorial engineering drafting. John R. Cassell Co. Inc., 110 W. 42nd St., New York 18.

Instrumaster: Line of drafting instruments of the stencil type for isometric and dimetric drawings. Instrumaster Industries, Inc., 73 Arch St., Greenwich, Conn.

Insulag: Plastic refractory insulating lagging. Quigley Co., Inc., 527 Fifth Ave., New York.

Insulbond: High-refractory bonding mortar in dry or plastic form. Quigley Co. Inc., 527 Fifth Ave., New York 17.

Insulbrix: Light-weight, cellular low-heat-storage insulating fire brick. Quigley Co. Inc., 527 Fifth Ave., New York 17.

Insulclad: Surfacing material for armor coating insulating brick. Quigley Co. Inc., 527 Fifth Ave., New York 17.

Insulcrete: Light-weight cellular insulating refractory castable for furnace linings, heat

shields, etc. Quigley Co. Inc., 527 Fifth Ave., New York 17.

Insul-Mastic: Gilsonite-base material, sprayed over large machinery to afford protection during shipment and storage. R. M. Hollingshead Corp., 846 Cooper St., Camden, N. J.

Insuluminum: Steel with a surface impregnation of Al for chemical engineering equipment. General Electric Co., Schenectary, N. Y.

Insulus: Lead-free non-toxic lacquer for black plate or steel; baked at 400° F; hard, tenacious and flexible. British Paints, Ltd., Royal Mail House. Leadenhall St., London, E. C. 3.

Interlake: Plywood adhesives, laminating, varnishes, plastic cements. Interlake Chemical Corp., Union Commerce Bldg., Cleveland 14.

Internalchek: Instrument utilizing an Electrigage head to check internal measurements. Sheffield Corp., Box 893, Dayton 1.

Interplane: Vertical disk for attrition grinders. Allis-Chalmers Mfg. Milwaukee 1.

Invar: C-Ni-Mn-Fe alloy for measuring tapes and instruments, thermostats. Driver-Harris Co., Harrison, N. J.; Henry Wiggin & Co., Ltd., Birmingham, England; Sec. Anon. De Commentry, Fourchambault et Decazeville, Paris, France; R. Y. Ferner Co., 131 State St., Boston.

Invar: 64 Fe-36 Ni alloy with controllable coefficients of expansion; for thermostats and metal-to-glass sealing. Republic Steel Corp., Cleveland; Crucible Steel Co., Chrysler Bldg., New York; U. S. Steel Corp., Pittsburgh; Diamond Saw & Steel Co., Lockport, N. Y.

Invastahl: 36 Ni-Fe alloy for clocks, balances, measuring devices. Vereinigte Deutsche Nickelwerke A. G., Schwerte, Germany.

Inventor: 13 Cr stainless for general engineering purposes, instruments, turbine blades. Brown Bayley's Ltd., Sheffield, England.

Invincible: Barbed wire. Bethlehem Steel Co., Bethlehem.

Iowa: Woven wire fencing, barbed wire. American Steel & Wire Co., Cleveland 13.

Ipcast: Ferrous and nonferrous alloy precision castings; small parts of complex contours, with accurate dimensions, smooth surfaces, and sound structure. Illinois Precise Casting Co., 613 W. 16th St., Chicago 16.

Iralite: Wear-resistant pearlitic cast iron with Cr-Mo for sheaves, sprockets, glass rolls, brake-drums, balls. Mackintosh-Hemphill Co., 901 Bingham St., Pittsburgh.

Ircoizing: A hot phosphate chemical treatment for metal surfaces such as steel, iron, cadmium and zinc. Converts the metal surface to a nonmetallic coating, predominately zinc phosphate, which improves the adhesion and durability of paint finishes. International Rustproof Corp., 12507-15 Plover Ave., Cleveland, Ohio.

Ircolene: Rust preventatives. International Rustproof Corp., 12500 Plover Ave., Cleveland.

Iridite: Chromate type, corrosion resistant finish for zinc and cadmium surfaces including plated, galvalized and diecast; colors and clear. Rheem Research Products, Inc., Standard Oil Bldg., Baltimore 2.

Iron Oilite: Self-lubricating bearings and machine parts made from powdered metals. Chrysler Corp., Amplex Div., P. O. Box 2718, Detroit 31.

Ironclad: Electric storage batteries. Electric Storage Battery Co., Philadelphia 32.

Ironton: See Caro-Line

Ironweld: Welding rod for cast iron. Steel Sales Corp., 3348 S. Pulaski St., Chicago.

Irving Decking: Open steel mesh pavement for bridges. Irving Subway Grating Co. Inc., 27th St. and 51st Ave., Long Island City 1, N. Y.

Isley: Openhearth furnace control system. Morgan Construction Co., Worcester, Mass.

Iso-Cast: Carbon, low-alloy and stainless steels, both heat and corrosion-resisting grades. Empire Steel Castings, Inc., Reading, Pa.

Iso-Elastic Alloy: Fe-Ni-Cr-Mo alloy with specific constant modulus of elasticity characteristics; for thermostats and metal-to-glass sealing. John Chatillon & Co., 90 Cliff St., New York 7.

Isorod: Corrosion and abrasion-resistant complex Fe alloy for wear plates. Resistoloy Co., Grand Rapids.

Isothermal Heat Treatment: Electric salt bath process for heat treating metals parts, consisting of austenizing, isothermal quenching, and a final drawing. Ajax Electric Co. Inc., Frankford and Delaware Ave., Philadelphia 23.

Isteg: Prestressed mild steel for concrete reinforcing bars. Isteg Steel Products Co., Westminster, London, England.

Izett Steel: Series of C-Mn-P-S-Si steels for boilers. Fried Kupp, Steel Works, Essen, Germany; Thos. Prosser & Son, 122 Wall St., New York 5.

J

Jabroc: Molded plastic for tools, jigs, templates. Moulded Components Ltd., Mill Lane, Croydon, Surrey, England.

Jack-Lock: Inserted-blade adjustable milling cutters in both standard and special styles, and special-purpose tools engineered to specific jobs. McCrosky Tool Corp., Meadville, Pa.

Jack Rest: Work support accessory for use with the Rockwell hardness tester in supporting extra long and extra heavy pieces. Wilson Mechanical Instrument Co., 383 Concord Ave., New York 54.

Jackmanized Steel: Steel for dredger bucket pins, bushes, tin rolls. Jos. Jackman & Co., Ltd., Sheffield, England.

Jalcase: Series of steels containing 1.5 Mn for general use and for case-hardened parts, screw stock. Jones & Laughlin Steel Corp., Pittsburgh.

Jalloy: High-tensile steel, resists heavy impact and abrasion. Jones & Laughlin Steel Corp., Pittsburgh 30.

Jal-Ten: Copper-bearing steel to resist atmospheric corrosion, for structural parts. Jones & Laughlin Steel Corp., 3rd & Ross Sts., Pittsburgh.

Jal-Tread: Floor plates. Jones & Laughlin Steel Corp., 3rd & Ross Sts., Pittsburgh 30.

Jamb-Pach: Air-setting, high-temperature plastic cement for sealing coke oven jamb joints. Quigley Co. Inc., 527 Fifth Ave., New York 17.

Janitrol: Domestic, commercial and industrial space heaters and furnaces. Surface Combustion Corp., 2375 Dorr St., Toledo 1.

Janney Alloy: Abrasion resistant bronze with Ni-Sn-Pb for bushings, bearings, sleeves and pump liners. Janney Cylinder Co., 8037 Frankford Ave., Philadelphia.

Javelin: Sewed-pieced buff. F. L. & J. C. Codman Co., Rockland, Mass.

Jay Bee: Firebrick. Mexico Refractories Co., Mexico, Mo.

Jefaloy: Molybdenum-bearing and ladle-treated cast irons; high strength, abrasion resistant; used for wear resistant, high strength parts. Jeffrey Mfg. Co. Columbus 16, Ohio.

Jefferson: Tailstock turrets, tool post turrets, pull feeds, machine vises, dividing heads, swing frame grinders, endless belt sanders, and foundry riddles. Jefferson Machine Tool Co., 660 W. 4th St., Cincinnati 3.

Jelenko: Cast gold for dental work. J. F. Jelenko, J. & Co., 136 W. 52nd St., New York.

Jelliff Alloy: High nickel-chrome (80-20) and Ni-Cr-Fe alloys for scale and corrosion resistance in furnace elements, rheostats, electrical instruments. C. L. Jelliff Mfg. Corp., 124 Pequot Ave., Southport, Conn.

Jersey Copper: Insect screen cloth made from extra hard drawn copper. John A. Roebling's Sons Co., Trenton 2, N. J.

Jetal: Chemical solution producing black-oxide coating on iron and steel, copper or copper plate in 5 min., for decorative and rustproofing purposes. Alrose Chemical Co., Providence 1, R. I.

Jetoil 1A: Rustproofing oil of a petroleum type with inhibitors for use over black oxide to give 50 to 100 hr. salt-spray test. Alrose Chemical Co., Box 1294, Providence, R. I.

Jewelite: Silicon-carbide abrasive. Clover Mfg. Co., Norwalk, Conn.

Jewell Alloy: Si-Mn-Ni-Cr cast iron for high-strength and heat-resisting castings, furnaces, glass molds. Jewell Alloy & Malleable Co., 3375 Hertel Ave., Buffalo.

Jewell Steel: Iron alloy for castings. Jewell Alloy & Malleable Co., 3375 Hertel Ave., Buffalo.

Jewelox: Aluminum-oxide abrasive. Clover Mfg. Co., Norwalk, Conn.

Jigmil: High-precision jig boring and milling machine. De Vlieg Machine Co., Ferndale, Mich.

Jirotka: Process for producing protective aluminum-oxide film on aluminum and aluminum alloys. Aluminum Co. of America, Pittsburgh; Reynolds Metals Co., Louisville.

Jisco: Silvery pig iron analyzing 6 to 17 pct Si, 1 to 3 Mn, 0.05 S and 0.15 P. Jackson Iron & Steel Co., Jackson, Ohio.

Joblin: Paper and fabric-base insulating material for engineering applications. Moulded

Components, Ltd., Mill Lane, Croydon, Surrey, England.

Johnson Bronze: Series of bronzes of various compositions for bearings, cylinder sleeves. Johnson Bronze Co., 477 S. Mill St., New Castle, Pa.

Jones: Power transmission machinery; worm spur and herringbone speed reducers, flexible couplings. W. A. Jones Foundry & Machine Co., 4419 W. Roosevelt Rd., Chicago 24.

Joslyn: Series of stainless steels. Joslyn Mfg. & Supply Co., 20 N. Wacker Dr., Chicago.

Junior: Steel posts. American Steel & Wire Co., Rockefeller Bldg., Cleveland 13.

Jupiter Transmission Rope: Composite wire and fiber rope having a surface with high coefficient of friction and intended for the mechanical transmission of power by means of friction-drives. John A. Roebling's Sons Co., Trenton 2, N. J.

K

K Monel: High-strength, non-magnetic form of Monel that is hardenable by cold working and heat treatment. International Nickel Co., Inc., 67 Wall St., New York 5.

Kalif Metal: Steel backed Pb-Cu mixture for bearings, wrist pin bushings. Hydril Co., Lomita, Calif.; Kalif Corp., Emeryville, Calif.

Kalloy: 30 Cr, high C stainless for furnace parts, retorts, baffle plates. Brown, Bayley's Ltd., Sheffield, England.

Kantark: Non-renewable, non-indicating cartridge fuses. Trico Fuse Mfg. Co., 5th and Chambers St., Milwaukee 12.

Kanthal: Fe-Cr-Al-Co alloy for heating elements. A. B. Kanthal, Hallstahammar, Sweden; C. O. Jelliff Mfg. Corp., 124 Pequot Ave., Southport, Conn.

Kant-Kink: Electrical cables. American Steel & Wire Co., Rockefeller Bldg., Cleveland 13.

Kant-Link: Lock washers. American Nut & Bolt Fastener Co., Pittsburgh.

Karbate: Sectional cascade cooler for corrosive liquids and gases. National Carbon Co., Inc., 30 E. 42nd St., New York.

Karmix: Metallurgical furnace cements. Fisher Furnace Co., 5541 N. Wolcott Ave., Chicago.

Kasson Rotomotor: Fractional horsepower electric motors. General Die & Stamping Co., 262 Mott St., New York 12.

Kastite: For making pre-cast special refractory shapes, baffles, door linings. Chicago Fire Brick Co., 1467 Elston Ave., Chicago 22.

Kathabar: System of humidity control for air conditioning. Surface Combustion Corp., 2375 Dorr St., Toledo 1.

Kathanode: Industrial batteries. Gould Storage Battery Corp., Depew, N. Y.

Kathode: Welding electrodes. Lincoln Electric Co., 12818 Coit St., Cleveland.

Kato's Oxide: 30 pct Fe_2O_3, 44 Fe_3O_4 and 26 Co_2O_3 permanent-magnet material. Arnold Engineering Co., 147 E. Ontario St., Chicago 11.

Kaul: Refractory hot tops and mold plugs. Kaul Clay Mfg. Co., Toronto, Ohio.

Kay-Brunner: Ni-Cu-Cr cast iron with Mn-Si for heat and corrosion-resistant parts. Kay-Brunner Steel Products, Inc., 995 Meridian Ave., Alhambra, Los Angeles.

Kaydon: Ball and roller bearings from 4 in. I.D. to 120 in. O.D. Kaydon Engineering Corp., McCracken St., Muskegon, Mich.

Kaykote: Low-temperature ceramic coatings for metal products; spray or dip on. Kraus Research Laboratories, Sparks, Md.

Kearney & Trecker: Machine tools. Kearney & Trecker Corp. and Kearney & Trecker Products Corp., Milwaukee 14.

Keetana: Hollow bored steel shafts. Keeton, Sons & Co. Ltd., Royds Lane, Sheffield 4, England.

Kelcaloy: Iron alloy for oil refinery equipment. M. W. Kellog & Co., Jersey City, N.J.

Kelco: Straight and water soluble oils and coolants for metal machining and grinding. Keystone Lubricating Co., 21st Clearfield and Lippincott Sts., Philadelphia 32.

Keleket: Industrial radiographic inspecting machines. Kelley-Koett Mfg. Co., 2208 W. 4th St., Covington, Ky.

Keller (ing): Die-sinking operation whereby tool is automatically activated by contactor on a pattern. Pratt & Whitney Co., Keller Division, Charter Oak Park, West Hartford 1, Conn.

Kellogg-American: Air compressors, spray guns, and spray painting equipment. American Brake Shoe Co., 230 Park Ave., New York 17.

Kem Lustral: Synthetic enamel for interior and exterior surfaces of wood or metal; for machines, pipes, railings, trucks, etc. Sherwin-Williams Co., 101 Prospect Ave., N. W., Cleveland 1.

Kembond: Chemically bonded magnesite brick. E. J. Lavino & Co., 1528 Walnut St., Philadelphia 2.

Kemick: Chemical paint that holds to hot metal surfaces even at temperatures above 600° F. American Chemical Paint Co., Ambler, Pa.

Kemifilm: Transparent and pigmented drying coatings for rustproofing and corrosion-proofing metal parts. Wayne Chemical Products Co., Detroit 17.

Kennametal: Series of cemented carbides used for tools to machine steel, cast iron, non-ferrous metals, and non-metallics; and for wear-resistant applications. Kennametal Inc., Latrobe, Pa.

Kentucky: Fireclay and fireclay brick. Portsmouth Clay Products Co. Inc., South Webster, Ohio.

Keokuk Electro-Silvery: High-silicon pig iron. Keokuk Electro-Metals Co., Keokuk, Iowa.

Keratyn: Low-temperature quick-bake porcelain-like finish. A. C. Horn Co., 43-42 10th St., Long Island City 1, N. Y.

Kerr Vacumatic: See Vacumatic.

Kersol: Water-soluble kerosene designed for cleaning metal parts. United Industrial Products, Inc., 1143 E. Jersey St., Elizabeth 4, N. J.

Key: Graphite paste joint sealing compound for use on oil and high-pressure steam service; also used as protective coating for machined surfaces during heat-treating of steel parts or assemblies. Key Co., P. O. Box 494, East St. Louis, Ill.

Keycut: Straight and water soluble oils and coolants for metal machining and grinding. Keystone Lubricating Co., 21st Clearfield and Lippincott Sts., Philadelphia 32.

Keydraw: Petroleum product, with no graphite, lead or sulphur, for punching operations on stainless or drawing of carbon steel. Keystone Lubricating Co., 21st Clearfield and Lippincott Sts., Philadelphia 32.

Keystone: Copper alloy for bearings. National Bearing Div., American Brake Shoe Co., 5002 Manchester Ave., St. Louis.

Keystone: Low heat duty fireclay brick. North American Refractories Co., 1012 National City Bank Bldg., Cleveland 14.

Keystone: Straight and water-soluble oils and coolants for machining and grinding operations; especially processed quenching oils; rust preventives and rust solvents. Keystone Lubricating Co., 21st Clearfield and Lippincott Sts., Philadelphia 32.

Keystone Copper Steel: Copper-bearing steel for roofing, siding, railroad car construction. Carnegie-Illinois Steel Corp., Carnegie Bldg., Pittsburgh.

Keystone Emery: For grinding, polishing, tumbling, sand-blasting and for wear-resisting floors. Keystone Emery Mills, 4329 Paul St., Philadelphia 24.

Key-Tite: Joint-sealing compound for use on water, air, gas and low-pressure steam service. Key Co., P. O. Box 494, East St. Louis, Ill.

Khasia Emery: For grinding, polishing, tumbling, sand-blasting and for wear-resisting floors. Keystone Emery Mills, 4329 Paul St., Philadelphia 24.

Kilindo: Non-rotating wire rope composed of 18 strands of 7 or 19 wires to the strand. Macwhyte Co., 2911 14th Ave., Kenosha, Wisc.

Kimolo: Insulating firebrick for metallurgical furnaces. Cellactite & British Uralite Ltd., Terminal House, 52, Grosvenor Gardens, London S. W. 1, England.

King: Firebrick. Laclede-Christy Clay Products Co., Ambassador Bldg., St. Louis 1.

King: Intermediate heat duty fireclay brick. North American Refractories Co., 1012 National City Bank Bldg., Cleveland 14.

King: Portable Brinell hardness tester. Andrew King, Narberth, Pa.

Kinnalloy: Ni-Cr alloy iron for castings. Kinney Iron Works, 2527 E. 49th St., Los Angeles.

Kinnite: Wear-resistant high-carbon Cr-Fe for abrasion-resistant castings. Kinney Iron Works, 2527 E. 49th St., Los Angeles.

Kirksite: Zinc-copper-aluminum alloy for dies in draw press and punch press operations. Kirksite Div., 111 Broadway, New York.

Kissock Steel: Wear resisting Ni-Cr-Mo steel for castings. Bonney-Floyd Co., Columbus, Ohio.

K-L Klincher: Lock nuts. Faultless Caster Corp., Evansville 7, Ind.

Klako: Refractory nozzles and sleeves for steel ladles, etc. Hiram Swank's Sons, Johnstown, Pa.

Kleanrol: White, crystalline powder used as a solder blanket flux in automatic soldering of sideseams in the manufacture of tinned containers. E. I. du Pont de Nemours & Co., Inc., Wilmington 98, Del.

Kleen Kwality: Washed and sterilized wiping rags and materials. Wiping Materials, Inc., 2000 N. Main St., St. Louis.

Kleenkut: Water-mix cutting fluid or "soluble" oil for metal-cutting. D. A. Stuart Oil Co., 2727 S. Troy St., Chicago 23.

Kleenseal: Manually operated lubricating equipment, grease fittings and accessories for farm and industrial applications. Lincoln Engineering Co., 5701 Natural Bridge Ave., St. Louis.

Kling Type Ladles: Sphere-shaped ladles, with a small top opening to conserve heat in molten iron from blast furnaces. William B. Pollock Co., 101 Andrews Ave., Youngstown.

Kliplok: Clamps for fuse clips, test clamps. Trico Fuse Mfg. Co., 5th and Chambers St., Milwaukee 12.

Klozure: Oil seals. Garlock Packing Co., Palmyra, N. Y.

Knock-Out: Machine tools and automotive maintenance equipment. K. O. Lee Co., Aberdeen, S. D.

Knoop Indenter: Pyramidal diamond indenter (hardness tester) making a diamond shaped (rhomb) indentation. Wilson Mechanical Instrument Co., 383 Concord Ave., New York 54.

Kodatrace: Translucent tracing material for clean, easy-to-read engineering prints. Eastman Kodak Co., 343 State St., Rochester 4, N. Y.

Kold-Hold: See Bowser—Kold-Hold.

Kolene: Process for removing scale, carbon, graphite and other metallic impurities to prepare ferrous metals, including cast iron, for subsequent tinning, silver brazing, plating and enameling. Kolene Corp., 315 Blvd. Bldg., Detroit 2.

Konag: Water-soluble cutting-oil additive; gasket seal. National Graphite Co. Inc., 6 Maiden Lane, New York 7.

Konel: Ni-Co-Ti- alloy with Si-Al-Mn for lamp filaments valves, valve stems. Westinghouse Electric Corp., East Pittsburgh, Pa.

Konik: Low copper-nickel-chrome steel for chains. Continental Steel Corp., Kokomo, Ind.

Konstantan: 54-Cu, 45 Ni, 1 Mn alloy for precision resistances, rheostats, electrical instruments. Vereinigte Deutsche Metallwerke, A. G., Altena, West., Germany.

Kontrol: Fire extinguishers. M. L. Snyder & Son, Jasper & York Sts., Philadelphia 25.

Korglaze: Vehicle for use with graphite in coating cores to prevent metal penetration and protect a fine line of cleavage between core and casting. United Oil Mfg. Co., 1429-31 Walnut St., Erie, Pa.

Koroseal: Synthetic thermoplastic material available in thin sheets or film; resistant to sun, oxygen, and extreme temperatures; is chemically inert and flame resistant; for laminated containers to hold acids and corrosives, and for insulating fine electric wire and cable. B. F. Goodrich Co., Akron, Ohio.

Kostico: Detergents for cleaning metal surfaces. Hanson - VanWinkle - Munning Co., Matawan, N. J.

Kote-Masq: Stop-off compound for selective electroplating. Hanson-VanWinkle-Munning Co., Matawan, N. J.

Kote-Rax: Rack-coating material. Hanson-Van-Winkle-Munning Co., Matawan, N. J.

Kote-Thinner: Solvent for Kote-Rax and Kote-Masq. Hanson - Van Winkle - Munning Co., Matawan, N. J.

Koval: High temperature resistant nickel alloy with Co-Ti-Fe; for internal combustion valves, molds and machine parts. Stupakoff Ceramic & Mfg. Co., Latrobe, Pa.

Kovar: Fe-Ni-Co-Mn alloy for electronic tubes, radio and X-ray tubes. Stupakoff Ceramic & Mfg. Co., Latrobe, Pa.

Kovar: 30 Ni, 15 Co iron alloy with 0.2 Mn for low-expansion parts in hard glass to metal seals. Westinghouse Electric Co., East Pittsburgh, Pa.

KR Monel: Form of Monel combining free-machining characteristics of R Monel with high strength and heat-treatable properties of K Monel. International Nickel Co. Inc., 67 Wall St., New York 5.

Kramer Alloy: Deoxidizing and densifying agents for nonferrous castings. H. Kramer & Co., 23rd & S. Loomis St., Chicago.

Kramer Manganese Bronze: Corrosion-resistant bronzes with 58-63 Cu, Fe-Al-Mn, bal. Zn for piston rods, valve stems, propellers. H. Kramer & Co., 23rd & S. Loomis St., Chicago.

Kramer Nickel Silver: 53-63 Cu with Ni-Zn-Pb-Sn for hardware, plumbing fixtures, valves. H. Kramer & Co., 23rd & S. Loomis St., Chicago.

Krane-Kar: Swing-boom mobile crane; front-wheel drive and rear-wheel steer. Silent Hoist & Crane Co., 851 63rd St., Brooklyn 20.

Kreidlers Brass: 58-63 Cu brass with or without 2.5 Pb; for screws, instruments, knives, tubes. Kreidler's Metall - und - Drahtwerke G.m.b.H., Stuttgart, Germany.

Kreolite: Wood block floors. Jennison-Wright Corp., 2465 Broadway, Toledo.

Kromag: Basic refractory brick made of recrystallized chrome ore and periclase. E. J. Lavino & Co., 1528 Walnut St., Philadelphia 2.

Kromag Cement: Dry high-temperature bonding mortar (chrome-magnesia base) for laying chrome, magnesite and chrome-magnesia brick. E. J. Lavino & Co., 1528 Walnut St., Philadelphia 2.

Kromepatch Cement: Dry high-temperature bonding mortar (chrome ore base) for laying all types of refractory brick. E. J. Lavino & Co., 1528 Walnut St., Philadelphia 2.

Krovan: Water-hardening alloyed steel for rolls. Hawkridge Bros., 305 Congress Ave., Boston.

KS: Permanent-magnet alloy, developed in Japan by Honda; cobalt, tungsten, chromium and molybdenum. Arnold Engineering Co., 147 E. Ontario St., Chicago 11.

K. S. Seewasser: Sea water resisting aluminum alloy with Mn-Mg-Sb-Si for furniture, light fixtures, and marine use. Karl Schmidt Co., Neckarsulm, Germany.

K-6 Metal: Complex alloy cast iron with Ni-Si-Mn-Cr; for piston rings and parts to resist corrosive gases and liquids. American Hammered Piston Ring Co., Bush & Plant Sts., Baltimore.

Kulgrid: High temperature resistant lead-in wires for vacuum tubes. Brookside Metal Co., Ltd., England.

Kunial Alloys: Cu-Zn alloys for engineering applications. Imperial Chemical Industries, Ltd., Birmingham, England.

Kupfer-Silumin: Aluminum alloy with 12 Si, Cu-Mn for wheels, rolls, engine blocks. Metallgesellschaft, A.G., Frankfurt, Germany.

Kuphed: Barbed dowel pins. American Steel & Wire Co., Rockefeller Bldg., Cleveland 13.

Kuplus: High yield-strength copper-bearing or chrome-bearing steel for structural work. United Steel Companies, Ltd., Sheffield, England.

Kux: Presses for powder-metal compacting. Kux Machine Co., 3927 W. Harrison St., Chicago 24.

Kwik-Klamp: Toggle clamps. Danly Machine Specialties, Inc., 2100 S. 52nd Ave., Chicago 50.

Kwik-on-an-off: Cover for tire valve caps. A. Schrader's Son Div., Scovill Mfg. Co., Inc., 470 Vanderbilt Ave., Brooklyn 17.

Kynal: Aluminum alloys. Imperial Chemical Industries Ltd., London, S. W. 1.

Kynalcore: See Kynal.

L

L-8: Cast aluminum alloy with 11-13 Cu, Fe-Si-Ti for carburetors, automobile pistons, high pressure castings. Birmingham Aluminum Casting Co., Ltd., Birmingham, England.

L-11: Cast aluminum alloy with 6-8 Cu for gear boxes, cylinder heads, sand or permanent-mold castings. Birmingham Aluminum Casting Co., Ltd., Birmingham, England.

L Nickel: Low-carbon form of nickel that lends itself to difficult deep-drawing and spinning operations; particularly resistant to molten caustic soda, and can be used for special high-temperature service. International Nickel Co., Inc., 67 Wall St., New York 5.

L. S. Cutting Bases: Highly compounded sulphurized cutting bases for blending with straight mineral oils or with an energizer such as Gulf Cut-Aid. Gulf Oil Corp., Gulf Bldg., Pittsburgh.

LaBour: High nickel-chrome-iron alloys with Cu-Mo-W-Si, for corrosion and heat-resistant valves and pump parts. LaBour Co., 1563 Sterling Ave., Elkhart, Ind.

Laclede Wallac: Firebrick. Laclede-Christy Clay Products Co., Ambassador Bldg., St. Louis 1.

(TO BE CONTINUED)

Canadian Output in '46 Of Nonferrous Metals Reaches 10-Year Low

Ottawa

• • • **Production of nonferrous** metals in Canada during 1946 was at the lowest record in 10 years, due to shortage of skilled labor, strikes and delays in obtaining equipment, according to the Dominion Bureau of Statistics. Feature of the metallic division was the fact that the value of lead and zinc recovery established all-time high records by virtue of increased prices. Gold recovery registered a gain of nearly 14 pct, despite reduction in value in the last half of the year through the government's action in returning the Canadian dollar to parity with the United States dollar, and British Columbia strikes. The value of silver sales jumped to the highest total since 1935, but copper and nickel dropped sharply.

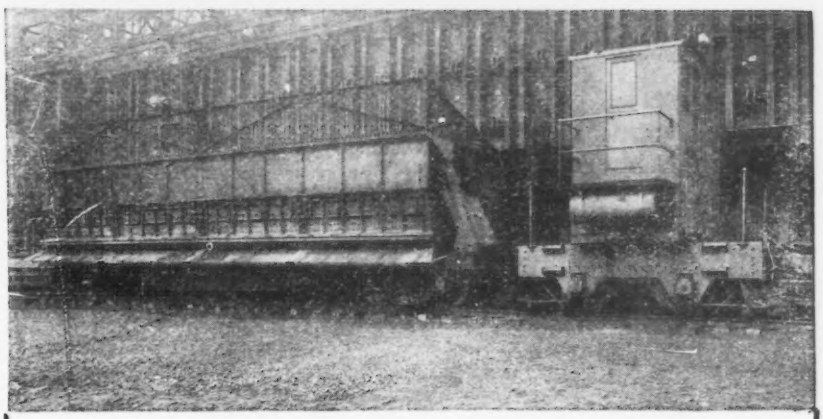
Gold recovery for the year amounted to 3,214,377 fine oz valued at $118,128,354 and compares with 2,696,727 oz valued at $103,823,990 in 1945. In quantity the figure was the highest since 1943 but was well below the record of $5,345,179 oz established in 1941.

Output of lead at 354,444,076 lb, valued at $23,924,975, made an all time high price record but was down in quantity against the high mark of 512,142,562 lb established in 1943. Zinc also reached a new peak in value at $36,850,174 despite a decline of more than 45,000,000 lb in recovery to 471,833,000 lb. The highest total for zinc was 610,754,354 lb in 1943.

Silver valued at $10,668,979 showed a gain of more than 75 pct over the preceding year, with value being the highest since 1935. However, the quantity produced at 12,778,213 fine oz was the lowest since 1906, and the dollar value was highest in 1912 at $19,440,165.

Nickel production at 190,811,179 lb dropped to the lowest point since 1936, although operations at International Nickel Co. have been running for the past month or so at the rate of best prewar years. Copper tonnage was down 22 pct to 185,543 tons, the lowest

COKE OVEN EQUIPMENT



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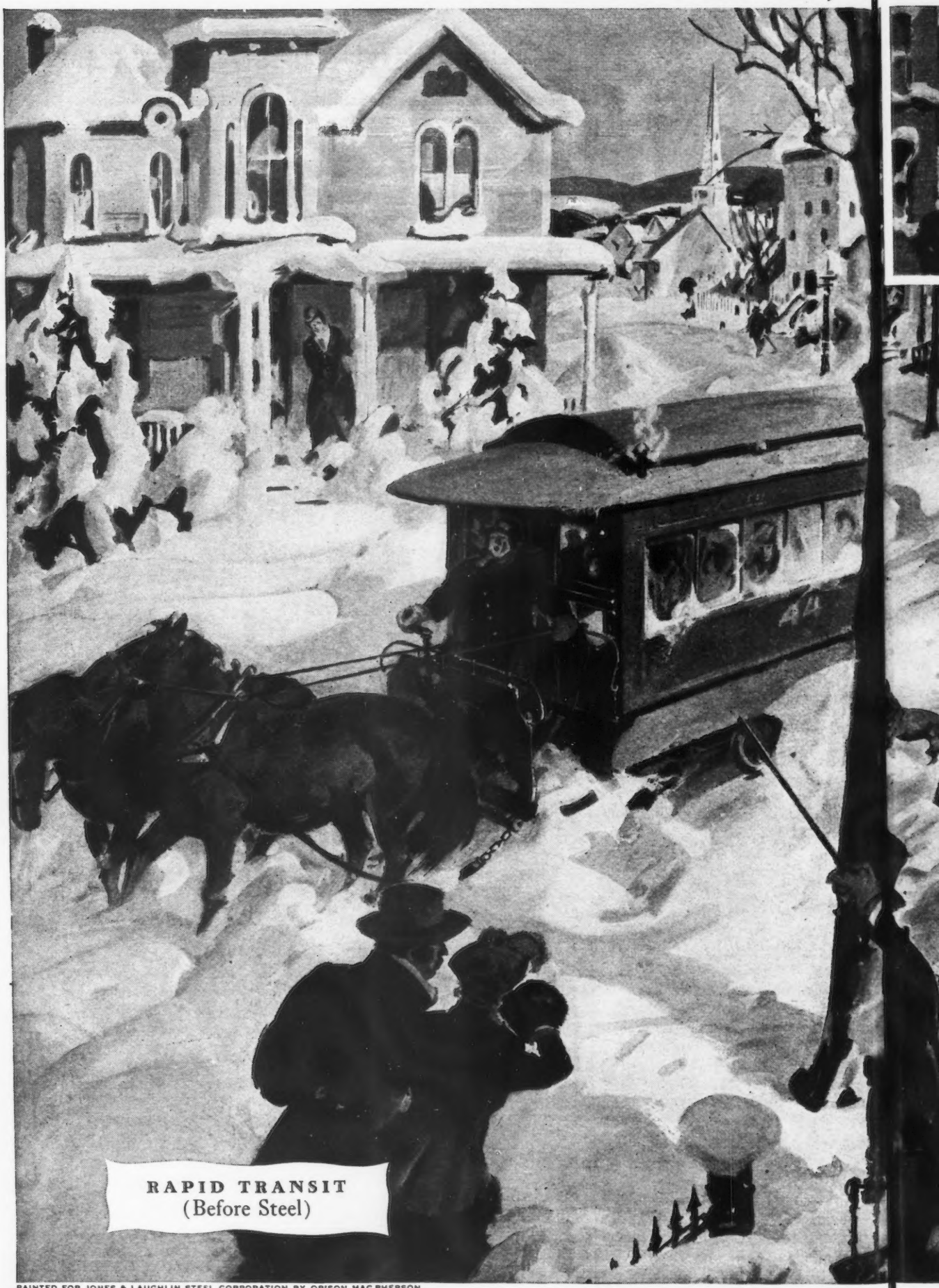

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Without steel, you would still be riding in slow, horse-drawn omnibuses jolting over cobblestones. Or, you would poke along at five-miles-an-hour seated on hard benches in a wooden horsecar. You would stifle in summer and shiver in winter with only straw on the floor to keep your feet from freezing.

Today, all public transportation originates in steel. Buses, trolley cars and taxicabs; elevated, subway and suburban trains are made of steel—most versatile and available of all the metals.

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Everyone walked to work as late as 1827, unless he owned private conveyances, for there was no local public transportation in America. But in New York that year Abraham Brower's "Accommodation," a horse-drawn, omnibus seating 12, appeared on unpaved Broadway, fare 1 shilling.

First horsecars to be operated anywhere in world made their appearance in New York City in 1832, carried only 10 passengers.

"Riding on the grip" became possible for first time in 1873 when first cable car in the world made its run in San Francisco.

An electric car at a fair in Toronto in 1885 as an amusement stunt was the forerunner of today's extensive electric transportation system. James A. Gaboury who owned controlling interest in horsecar system at Montgomery, Ala., saw it and worked out a plan for electrifying his railway. Thus Montgomery became first city in world to have trolley car system.

Today's new streamlined trolleys are development of the Electric Railways Presidents' Conference Committee. Tryout car was completed in 1934. The new cars are now operating in 60 cities.

Trackless trolley line in Merrill, Wis., 1913, was first use of this system.

Elevated railways are as American as cable car. C. T. Harvey devised plan in 1867 for elevated road in N. Y. City. Cars were pulled by rope attached to stationary engine. Steam locomotives came next, then electrification.

Boston opened first subway in U.S. in 1897 (fifth in world). It handled more than 50 million passengers during first year.

N. Y. City all-steel subways cost nearly $1½ billions, haul 2½ billions of passengers a year, 6 millions a day, operate 12,411 trains daily at average speed of 17 mi. per hr., employ 35,000 people and you can ride 22½ miles in 78 minutes for 5 cents.

1st common-carrier motor bus in America was put in service in 1905 by Fifth Avenue Motor Coach Company in New York.

Bus and car builders use J&L Otiscoloy high-tensile steel to reduce deadweight and increase carrying capacity. For booklet write nearest J&L office listed at left or Publicity Manager, Jones & Laughlin Steel Corporation, Pittsburgh 30, Pa.

Canadian Comparative Metal Production Figures for 1946-45

	1946		1945	
	Quantity	Dollar Value	Quantity	Dollar Value
Antimony, lb	685,000	102,750	1,667,951	290,557
Arsenic, lb	745,000	39,100	2,045,730	180,866
Bismuth, lb	234,000	327,600	189,815	260,047
Cadmium, lb	761,400	928,908	646,064	639,603
Calcium, lb	53,548	75,592	22,720	19,312
Chromite, tons	3,100	58,125	5,755	160,752
Cobalt, lb	74,902	61,794	109,123	90,026
Copper, lb	371,085,000	47,013,560	474,914,052	59,322,261
Gold, fine oz	3,214,377	118,128,354	2,696,727	103,823,990
Lead, lb	354,444,076	23,924,875	346,994,472	17,349,723
Magnesium, lb	323,234	75,350	7,358,545	1,607,264
Molybdenum concentrates, lb	751,197	350,032	978,177	411,663
Nickel, lb	190,811,179	46,844,738	245,130,983	61,982,133
Palladium, etc. oz	114,200	4,758,717	458,674	18,671,074
Selenium, lb	534,000	902,750	379,187	728,039
Silver, fine oz	12,778,218	10,688,979	12,942,906	6,083,166
Tellurium, lb	48,200	65,300	484	929
Tin, lb	874,000	480,700	849,983	492,990
Titanium ore, tons	1,352	6,830	14,147	67,574
Zinc, lb	471,833,000	36,850,174	517,213,604	33,308,556
Total Metals		$304,736,412		$317,092,674

since 1934, and was only 56.6 pct of the country's 1940 figure.

Byproducts of certain of the base metal mines, such as cadmium, selenium, and tellurius, were on a higher level than 1945, but several of the war metals, including mercury and tungsten, disappeared from the list entirely. Output of molybdenite concentrates, chiefly from the property of Molybdenite Corp. in northwestern Quebec, amounted to 751,197 lb, valued at $350,032. Magnesium dropped to $75,350 from $1,607,264 owing to the fact that the plant of Dominion Magnesium was closed for most of the year. Renewed activity of the cobalt area was not accompanied by a rise in output of cobalt metal the total amounting to only 74,902 lb against 109,123 lb in 1945.

CPA Urgency Tags On WAA Surplus Material Have Been Eliminated

Washington

• • • **Urgency certificates** giving holders first call on stocks of surplus materials and equipment held by WAA will no longer be issued by CPA. Such certificates were issued by CPA under Dir. 16 to PR-13, which was revoked on Jan. 17. All outstanding urgency certificates remain valid until their expiration dates if not sooner satisfied.

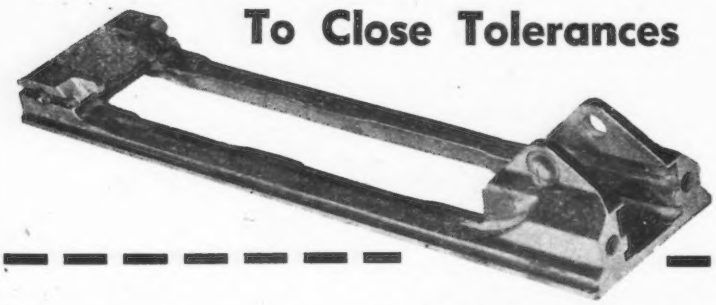
This action, however, does not affect Housing Expediter certificates (which are similar to urgency certificates) which may be issued by the Housing Expediter under HEPR-4.

At the same time, CPA issued an amendment of Direction 3 to PR-13, which governs the issuance of individual directives on WAA in favor of named persons or classes of persons. CPA said that in general such directives would be limited, as before, to exceptional cases of public emergency. However, two new categories have been added which may be eligible for such directives. One of these, military contractors on non-deferable defense programs certified by Army or Navy, were formerly eligible for urgency certificates under the revoked Direction 16 to PR-13.

The other new category in the direction, but for iron and steel items only, applies to builders and repairers of freight cars.

CPA has set a production goal of 7000 freight cars a month for 1947 and it is hoped that CPA directives on surplus stocks will aid in the effort. Details of the freight car program appear on p. 102 of this issue.—Ed.

PRECISION PRODUCTS
To Close Tolerances



AS a result of its wartime activities in manufacturing gun parts, which brought the Army-Navy Award with three stars, the Hendrick plant now has surplus facilities available for making small to medium size precision products to close tolerances. In fact, it is a common procedure for Hendrick's experienced machine tool operators to work to a tolerance of .0005 inches.

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Superior Steel Markets New Clad Metal Strip

Pittsburgh

• • • The development of rolled nickel and Monel clad strip was announced by the Superior Steel Corp., Carnegie, Pa.

This composite strip is available in widths between ¼-in. and 10 ¼-in., in coils ranging up to several hundred feet depending upon gage. In the cold-rolled condition it is produced in thicknesses between 0.01-in. and 0.125-in. In the hot-rolled condition it is available in thicknesses between 0.095-in. and 0.25-in.

Depending on requirements, the clad strip is furnished with cladding on one side only or on both sides. The standard cladding thickness is 10 pct of the total thickness, which means that on the single clad strip the nickel or Monel would represent 10 pct of the total thickness and the steel 90 pct. On double clad strip the three layers would be 10 pct nickel or Monel, 80 pct steel, and 10 pct nickel or Monel.

It is said to be impossible to separate the nickel or Monel cladding from the steel base by any other means than the chemical dissolving out of the steel from the cladding. Separation is reported not to be effected by mechanical means or by heating. Because of this fact, the clad strip can be stamped, drawn, spun, bent, spot-welded, or otherwise fabricated in the same manner and with no more difficulty than ordinary low carbon, deep-drawing steel.

Because the thermal coefficient of expansion of nickel, Monel and steel are nearly the same, there is little danger of warping or twisting in applications where temperature changes are encountered.

The clad strip marks another advance in the production of nickel and Monel clad material which was pioneered 16 yr ago with the introduction of clad steel plate. It combines the corrosion resistance and strength of nickel or Monel with the properties of steel. The cost is approximately 30 to 35 pct less than that of solid nickel or Monel strip. It is anticipated that this new product will supplement rather than compete with the solid materials. Frequently, combinations of the

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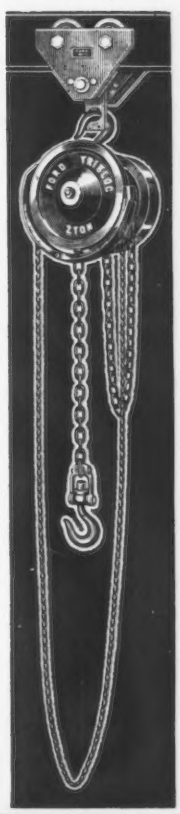

"Handling Problems" do not necessarily mean trouble. In thousands of busy shops FORD Chain Hoists and Trolleys are making little jobs out of big ones. They're easy to use—hard to wear out. That's because they're designed with few moving parts, built to take punishment. Whether it's for once-in-a-while or for all-day-every-day use—choose FORD. Capacities 250 pounds to 40 tons.

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52

clad and the solid materials can be used to advantage to provide maximum economy of construction.

While the thinnest standard strip produced by Superior Steel Corp. is 0.010-in., the material is available in lighter gages by special arrangement.

Mining Congress Names Committee to Aid Krug On Mineral Policies

Washington

• • • **Appointment** of a committee, representative of all branches of the mining industry, to advise Interior Secretary J. A. Krug of the industry's viewpoint with respect to national mineral policies and the activities of the Interior Dept., dealing with minerals, has been announced by the American Mining Congress.

The committee's formation was requested by Secretary Krug when he addressed the fall meeting of the Western Division, American Mining Congress, in Denver. The group will meet with the Secretary at an early date. Special attention will be given to quetions affecting mining operations on the public domain.

The committee membership is as follows:

Chairman: Howard I. Young, president, American Zinc, Lead & Smelting Co., St. Louis.

Coal: James D. Francis, president, Island Creek Coal Co., Huntington, W. Va.

Iron Ore: R. C. Allen, vice-president, Oglebay Norton & Co., Cleveland.

Copper: W. W. Lynch, Calumet & Hecla Consolidated Copper Co., N. Y.

Zinc: Edward H. Snyder, president, Combined Metals Reduction Co., Salt Lake City.

Lead: Andrew Fletcher, executive vice-president, St. Joseph Lead Co., N. Y.

Other Metals: Worthen Bradley, president, Bradley Mining Co., San Francisco.

Nonmetallic Minerals: H. M. Albright, vice-president, United States Potash Co., N. Y.

Alternates: Donald A. Callahan, president, Callahan Consolidated Mines, Inc., Wallace, Idaho; S. H. Williston, vice-president, Cordero Mining Co., San Francisco.

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Finds Union Contract Which Exactly Details Right of Management

New York

• • • **In its continuing study of** "Trends in Collective Bargaining," the National Industrial Conference Board reports a union contract which states in considerable detail just what management's rights are. Most agreements between management and labor simply state that the company has the sole and exclusive right to manage the affairs of the business and to direct the working force of the company. Contracts which definitely draw the line between management's and labor's rights are relatively rare.

An agreement nogotiated between a midwestern metal plant and the American Federation of Labor states that management can: (1) determine the products and schedules of production and the methods and processes of manufacture; (2) determine the basis for selection, retention and promotion of employees for occupations not within the bargaining unit established in this agreement; (3) mantain discipline and efficiency of employees including the right to make reasonable rules and regulations for the purpose of efficiency and discipline; (4) direct generally the work of the employees subject to applicable requirements of this agreement, including the right to hire, discharge or suspend employees for good cause and also to promote employees, demote, or transfer them between departments for proper cause, to assign them to shifts, determine the amount of work needed and to lay them off because of lack of work in accordance with the provisions of the contract; (5) determine the number and location of company plants.

"Any dispute arising out of questions as to the right of the Company to exercise the sole and exclusive function to manage and direct the affairs of the Company and to direct the working forces," the contract continues, "shall be deemed to be non-arbitrable under the terms of this agreement except insofar as such direction of the

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working forces is alleged to be in violation of any other provision of this agreement."

Both employers and employee representatives agree that a contributing factor toward better labor-management relations lies in simpler wording of the agreements and in the ability on the part of supervisor and worker to understand its terms. A CIO union and a textile firm recently negotiated a contract which contains a section called "Here's How." Here, in informal, almost conversational, fashion are definitions and explanations of union shop, grievance machinery, seniority, and other terms appearing in the contract.

Typical of the simple explanatory style employed is the definition for a grievance. "A grievance is a disagreement. It may come about because of a misunderstanding, an oversight, an honest error in judgment or a dozen similar reasons. Our grievance machinery has been created to talk these things out, to explain, reach an agreement, make an adjustment if necessary, and to better understand each other. We all want amicable adjustment of all disputes and grievances. This is our most important goal in what we call industrial relations. If we all want it, and will do our share toward accomplishing it, we will have few grievances."

Cutting Tools Up for Sale

Washington

• • • **Some $58 million worth of surplus cutting tools, formerly offered for sale through industry agreements, are to be placed on the block on a competitive bid basis, WAA announces. An additional $24 million worth will be offered when declared surplus.**

The tools will be offered in lots of not less than $5,000 worth. Lots will have three classifications — new standard catalog items in original containers, new standard catalog items not in original containers, and used standard and new special purpose tools. Most WAA regional offices have inventory lists and other information.

WAA Anticipates Upward Trend in Sales of War Surplus Machine Tools

Cleveland

• • • **With more than $100,000,000** worth of war surplus machine tools and production equipment on hand, the Cleveland regional office of War Assets Administration faces 1947 with an optimistic outlook on sales to be effected to established industry and to new companies entering the manufacturing field.

Because of intensive advertising and reduction in prices, the expected sales trend is definitely upgrade. Personal visits to industry by six WAA representatives in the Cleveland region are helping to create a better understanding of the program for obtaining new machine tools.

Numerous manufacturers are taking the opportunity—some of them for the first time—to replace old, worn-out machinery with new models at a fraction of their original cost. Approximately 600 salesmen employed by WAA-approved machine tool dealers in this area also are contacting industry in an effort to place government-owned equipment into useful channels.

The list of short supply machine tools, available only to priority holders, has been greatly reduced, thereby allowing more surplus equipment for sale to the public. By analyzing machine tool sales, WAA officials learned that many machines placed on that list were not in demand by priority holders and were, therefore, removed and placed on the open market. This allows licensed dealers to have a greater selection of tools to sell.

Surplus machine tools fall into the following sales categories: (1) overage and special types of machinery which sell on a bid basis; (2) special machine tools which sell at fixed prices; (3) equipment selling under the Clayton formula which allows a discount in proportion to age and use of the machines; and (4) short supply merchandise selling only to priority buyers.

Sees Auto Wage Drive With Low Productivity As Threat to Economy

Detroit

• • • **"The union-monopolies' drive for higher wages in the automobile industry, where productivity has not increased in 10 yr and costs have risen sharply, is detrimental to the entire economy,"** George Romney, general manager of the Automobile Manufacturers Assn., told a Detroit audience recently.

The only key to higher wages and lower prices in the automotive industry is to improve production efficiency resulting from better methods and more output per manhour that reduce manufacturing costs, Romney said.

According to the AMA executive, the automobile industry has attained its present position of industrial leadership through an equitable sharing by customers, workers and investors of the combined efforts of the industry's managements and workers. Up to the mid-thirties, Mr. Romney pointed out, under the successful formula of volume production and steadily improved productivity the motor industry was able to reduce prices, improve car quality and boost real wages.

Commencing with the mid-thirties, however, production efficiency of the automobile industry began to lag despite improvements in tools and production methods. Mr. Romney said. Contrary to earlier trends, output per manhour for the automobile industry has shown no increase since 1936, although hourly wage rates were increased from 76¢ in 1936 to $1.33 in 1946. Manufacturing costs have soared because of reduced volume, higher material costs and higher wages. Profits have declined. Contrary to the historic trend, prices have gone upward. This adverse cycle has reached the point where millions of previous car buyers are being priced out of the market, Romney concluded.

Mr. Romney predicted that with the restoration of productive efficiency in the motor industry it will again be possible to raise wages, lower prices, broaden markets and create more jobs.

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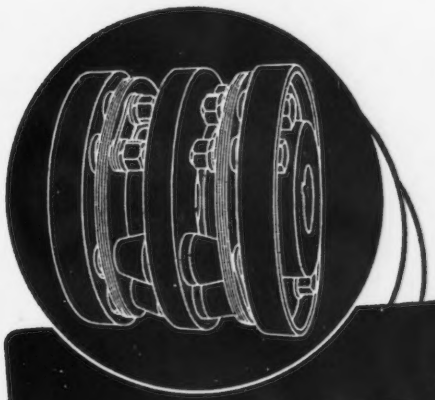

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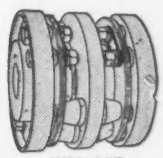
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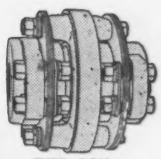
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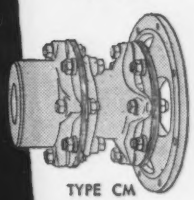
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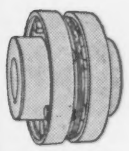
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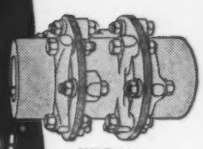
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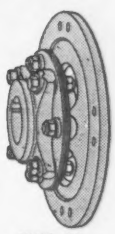
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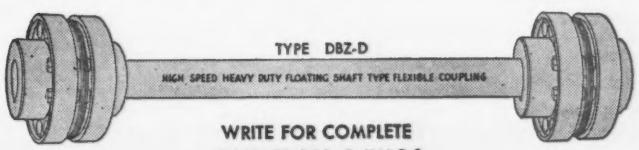
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Weekly Gallup Polls

(CONTINUED FROM PAGE 105)

act at present allows workers to call for an election to determine union representation, but does not allow management to precipitate such an election. There are also restrictions against management attempting to sell its point of view to workers before such an election.

The poll asked:

"Do you think the Wagner Labor Act should be left as it is, changed, or done away with?"

The vote of those who indicated a general familiarity with the act:

	Pct
Left as is	36
Changed	53
Done away with	11

Those who voted for changes were asked what changes should be made. The principal ones given by the voters were: Management and labor should be on a more equal basis; the act should be strengthened to protect employers more; it should have more restrictions on strikes; and it should limit the power of labor leaders.

Studies of opinion in former years show that the Wagner Act has never had the acceptance of the general public.

From the time of the act's adoption, polls have never found a majority with opinions thinking it should be left on the statute books unchanged. Sentiment has always been preponderantly in favor of revising or repealing the law.

Today's study would seem to indicate that if labor union leaders wish to protect the act from changes, they should take time out to educate public opinion on the act so that more people will know what unions are talking about when they refer to it as "labor's Magna Carta."

•

• • • **Congressional leaders** working on the new tax laws will be interested in the way Britain's heavy taxation may have affected the initiative of the British people.

The reason given more than any other by the people of England to explain why the population doesn't work harder is the high level of taxation. There's not much point, in other words, in working harder and earning more money, because the government takes most of it away.

This finding emerged when the British Institute of Public Opinion asked Britons:

"What do you think is the main reason why many people are not prepared to work harder than they are doing at the present time?"

The list:

	Pct
High level of taxation	18
Not enough goods to buy with money earned	5
War weariness	12
Insufficient food	9
Wages are too low and living costs too high	6
People are too lazy and/or selfish	8
Anxiety and lack of security	4
Poor promotion prospects, bad working conditions	3
Too much coddling; wages too high	3
Bad living conditions	4
Not enough incentive	2
Other comment or no opinion	26
	100

The finding has especial interest today as a measure of the degree to which people in Britain find the present tax level burdensome and a dampener upon incentive.

The precise degree to which such thinking affects a national economy would, of course, be difficult to say; but it is safe to assume that in a period such as the present, lack of incentive could easily have a depressing effect on the level of business activity and a marked bearing upon future national prosperity.

On the basis of rates of income taxes, the British have to pay a heavier tax than the American people; but the Americans have other kind of taxes—for example, city and state taxes.

On a per capita basis, the Americans pay more in all forms of taxes than the British, but they also make more than the British on a per capita basis. Other factors enter to prevent any precise comparisons.

The importance of the British findings lies in their demonstration of the fact that incentive does operate in individual thinking and can therefore very possibly be a strong factor in national productivity in any country operating under a system of free enterprise or a country utilizing the profit motive.

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The London Economist

(CONTINUED FROM PAGE 109)

tend to Slovakia in anything like the same degree. There the left polled only 30 pct of the votes in the general election, the right 60 pct. One result of this division is that, compared with the Czechs, the Slovaks are being pampered. Over half the new capital expenditure of an industrial nature proposed under the Two-Year Plan will be spent in Slovakia. The bulk of the machinery dismantled from the surplus ex-German factories in the Czech borderlands goes thither.

Such a policy has two ends, the immediate one of damping down the Slovak impatience at losing their wartime independence and prosperity, the other of making the Slovaks more industrialized and so, *ex hypothesi*, more socialistic. But in the meantime, relations between Czechs and Slovaks are bound to suffer minor, and probably vociferous, strains.

But, at base, the emotion which holds together the Czech peoples is fear of Germany. It is also the emotion which makes them look towards the East rather than to the West. The Czechs do not suffer from illusions. Their history and 7 years of occupation do not encourage that failing. They have driven out 3 million Germans from lands they had occupied for generations, and the German nature is not forgiving.

The problem of the Germans in Czechoslovakia has been a cruel dilemma for the Czechs, but, after the conduct of the Sudeten Germans between the wars, who can criticize their expulsion? Yet no one in Britain with any sense of how long the bitterness caused by the plantations in Ireland lasted can permit himself the illusion that the expulsions of 1946 are anything more than an end to a chapter.

It is easy to talk about Czechoslovakia as a bridge between East and West, but the idea presented by the phrase is untrue. Czechoslovakia is interested in the West, culturally, socially, economically and aesthetically, but a bridge lies across a stream. Czechoslovakia is definitely on the eastern bank.

Again, the main cause of this is fear, and in this case the fear is common to Czechoslovakia, USSR and Poland. All have despoiled Germany of what was once German, and in consequence all are watching with considerable anxiety, to see what happens in Germany. That is their common link and closest tie.

These factors however, affect all Europe. And, if the progress of the Republic in 1946 is to be judged fairly, it must be judged against the performances of the other affected countries, not against an ideal standard.

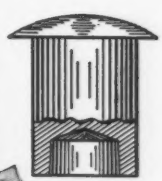
By this comparison Czechoslovakia stands out remarkably. It has a political stability greater than that of France, Belgium, Italy or Greece. It has infinitely greater freedom of political thought and expression than in any other country within the Russian orbit. Its people are as near to prewar productivity as those of any other country. It is carrying out an economic experiment of far greater relative magnitude than Britain. Its finances are well managed—political experiments have not been permitted to disturb that field. Above all, it has self-confidence. It is something of an oasis in Central Europe and it is to be hoped that the oasis will spread rather than be engulfed by the desert from which it so vividly stands out.

Italy to Get French Scrap

Paris

• • • **Italy will receive** 70,000 metric tons of scrap from France and French North Africa, according to the terms of a trade agreement recently negotiated between the two countries. In addition to the scrap iron and steel, France will furnish 70,000 tons of bauxite, plus 50 million lire (about $222,000) worth of farm equipment and 60 million lire (about $266,000) in textile machinery. French imports will consist mainly of citrus fruits, sulphur, and 70 million francs (about $580,000) of machine tools.

EVER SEE THESE?



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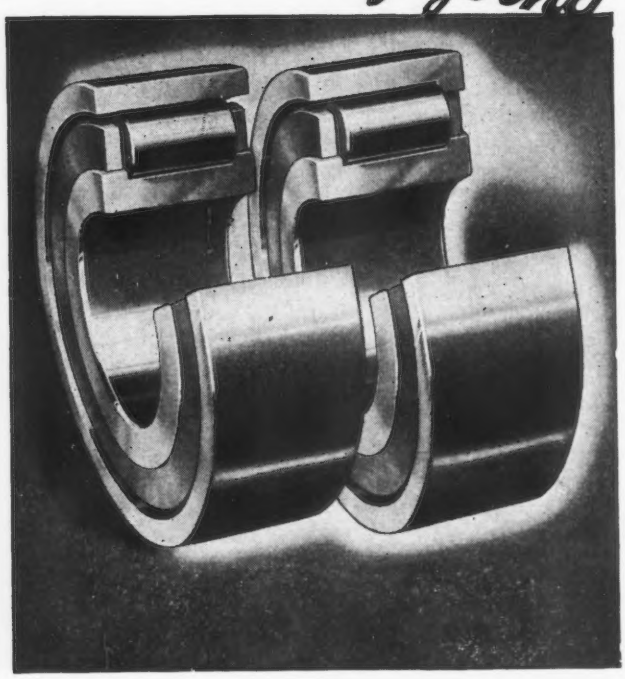

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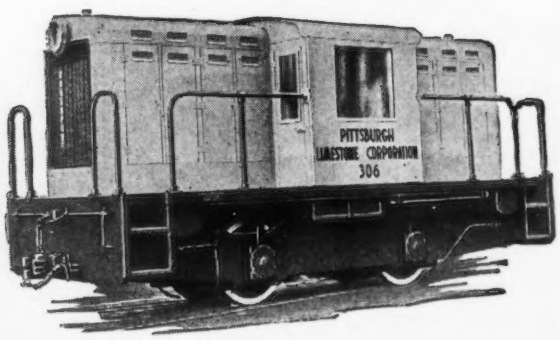

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